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Do you find the statistical vocabulary in the *Journal* a stumbling block in understanding new findings? In more than half of the research papers published in the first nine issues of the *Journal* for 1953, the results were analyzed and discussed statistically. Today, statistical analysis is almost routinely used to determine the significance of results in biologic research. Because of this growing trend, the Journal Board recommended the publication of material to give the average reader without training in statistics an understanding of its principles, concepts, and language. To this end, Dr. Schueler was invited to prepare a discussion of the simpler statistical treatments. Comprehension of these concepts and principles will require study. However, after studying this series of three papers, the editors believe that readers should have not only a clearer understanding of statistical discussions included in research reports, but also of the simpler statistical techniques.

A Guide to Statistics

I. Concepts and General Considerations

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STATISTICAL principles as a tool in research should be understood by those who use it in the evaluation of their data, at least as well as most elementary principles governing the operation of their spectrophotometer. The basic principles of statistics—just as the fundamentals of electronics and light absorption—may be grasped in an intuitive fashion with no more than elementary knowledge of college algebra and a familiarity with graphic presentation.

It will be the objective of this discussion to present in a "conceptual fashion" a brief review of some of the more widely used methods of elementary statistics. Because of space limitations, the entire presentation will be divided into three parts which will appear in successive issues of the JOURNAL. The parts will deal with the following specific concepts and methods:

Part I—Concepts and General Considerations

Populations, Samples, and General Considerations
Probability and Distributions
Parameters and Statistics
Degrees of Freedom as Applied to Unrelated and Related Samples

Part II—Calculation of Statistics

Mean and Standard Deviations
Null Hypothesis and Significant Differences
Variances
c and *t*
χ^2—Chi Squared
Examples

Part III—Graphing and Correlations

Fitting Empirical Curves
Correlation and Causality
Examples
Selected Bibliography

For optimal balances between understanding and usage, typical examples are included at the end of Parts II and III, where explicit illustration seems needed.

POPULATIONS, SAMPLES, AND GENERAL CONSIDERATIONS

The most fundamental concept in statistics is the notion of an infinitely large and, therefore, hypothetical population of measurements. The term *population*, as used in statistics, means all those measurements which would be obtained if a given measuring process were repeated indefinitely in a given situation. Such a concept arises because the values obtained upon repeating a given measurement are subject to fluctuation due to a host of disturbing influences. Thus, no single measurement, or limited group of measurements, will describe exactly all possible results of the measuring process in the given situation. Ideally, only an endless and, therefore, unattainable repetition of the measurements could describe the "exact" limits of variation of the results obtained by the measuring process.

Since this "exact" knowledge is not attainable, the investigator must be satisfied with a limited sample. The object, then, is to obtain a *sample* as *representative* as possible of the infinite *population*

and to have some idea of the degree to which it is actually representative of the population. The methods of statistical analysis allow one to achieve this more modest objective, by:

(a) *Summarizing* in a concise and more comprehensible fashion the primary data.

(b) *Determining* the degree of reliability of the results through an estimate of the degree of fluctuation in the measurements when due to *random* disturbing factors.

The point of view of statistics is closely allied with a fundamental tenet of science itself—that all knowledge is relative and subject to error owing to the nature of the processes through which it is derived. "Truth" in science is, therefore, a question of estimating the significance of results in terms of degrees of probability[1], not a question of the absolutely affirmative or negative.

SOME IMPORTANT GENERAL CONSIDERATIONS

Since the result of a test for significance is a probability, it *never* guarantees the absolutely affirmative or negative significance of anything. Rather, it only *estimates* the *degree of reliability* of the experimental result in the light of an estimate of the fluctuations in the measurements due to various random disturbing factors.

What magnitude of probability should be depended upon in the interpretation of a result? There is no *absolute* answer even to this question. It depends upon just how certain, in terms of a *calculated risk*, one desires to be! A few approaches to this latter problem are possible, through precedent. The main lessons from precedent are the following:

(a) One *can* establish a significant difference in a positive sense, *but* one can *never* establish, once and for all, a difference as *not* significant. Why? Because someone with a more sensitive (accurate) and precise (reproducible) method may, someday, establish to a high degree of probability the existence of a difference previously "covered up" by random variation. On the other hand, if one obtains a highly probable difference by a crude method, then a more precise method should merely emphasize the reliability of the difference, *provided* the two methods actually are operating upon essentially the same situation so that only the random degree of variation in *methods*, not in the factors, has been altered.

(b) One can, by study of the literature in a given field, learn the "acceptable" limits of variation. This will at least lead to some uniformity in the literature in that field as to the meaning of significant difference[2]. Some investigators require, for the null hypothesis[2] in the establishment of a significant difference, a probability, $p = 0.001$[2] or less, while others feel safe enough with a probability, $p = 0.01$.

Clearly, everything is relative: a $p = 0.001$ is superior to a $p = 0.01$, and so on. How dangerously shall one live?

PROBABILITY AND DISTRIBUTIONS

Following an experiment in which the investigator has corrected for all so-called *ponderable* errors (i.e., correction for indicator blanks in titration, and so on), it may be felt that the fluctuations which remain among the sample values are due to a random distribution of *imponderable* errors (e.g., random fluctuation of line voltage, etc.). Indeed, if a large sample has been obtained, this feeling will probably be justified by the fact that the majority of values tend to "cluster" about some central figure. In very large samples, when only random errors occur, one obtains a *distribution* of values such as that diagrammed in Figure 1. This graph is known as the *normal* distribution curve. It represents the probability (p) that a given measurement (x) will be observed in a group of measurements in which only random errors occur. Or:

> The *probability* that a given value (x) will *deviate* from the mean[3] value (μ) of the population is represented by the magnitude of its corresponding (p) in the graph. More concisely, the *probability* of the *deviation* $(x - \mu)$ is represented by (p).

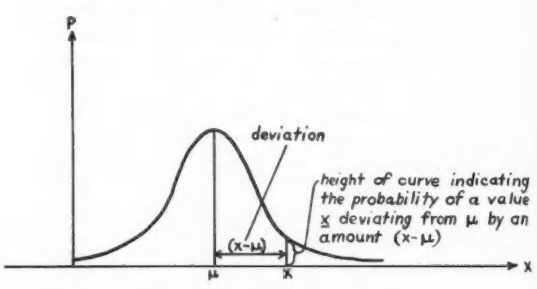

FIG. 1. *The normal distribution curve*

x = any measurement value
p = relative frequency or probability (p)
μ = that value of x observed most frequently (the *mean* of the distribution)
$(x-\mu)$ = the *deviation* corresponding to the given measurement value x

In this graph of the random distribution of values (x) *about the mean* (μ), *one notes the "clustering of values" as a "hump" over the mean* (μ). *Such a curve expresses quantitatively the idea that the probability* (p) *grows smaller and smaller for values of* (x) *which deviate more and more from the mean* (μ). *In short, this curve "tails off" in a symmetrical manner for less and less likely values of* (x).

[1] Probability is measured on a scale ranging from 0 to 1, a probability of 1 representing absolute certainty.

[2] These terms are used here only for purposes of general orientation; their exact definition will be made apparent in later sections.

[3] In all that follows, the term "mean" connotes the ordinary arithmetic mean or common average. Rules for the actual computation of such quantities will be introduced at appropriate points.

The "smooth" curve (*Fig. 1*) represents the ideal graph that would be obtained after an endless number of measurements. Any limited *sample* would be more irregular; only when the sample increases, without limit, does it approach this ideal *population* distribution curve. This is, of course, merely a restatement of the relationship which the *sample* holds to the *population* as already discussed.

In viewing the population as the ideal approached by increasingly larger samples, one gains an idea of great practical import:

> The sample could be used to represent the population *if* one could estimate the degree to which the sample errs as a representative of the population.

The *if* here, as always, is a very important, though small, word. In this case, however, the actual limits to which the sample will represent the population can be calculated. The mathematical theory of statistics provides one with a precise formula[4] for the probability of occurrence of values of various magnitudes in a population where only *random* errors occur. This formula is:

$$p = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{\frac{-(x-\mu)^2}{2\sigma^2}}$$

An "anatomical" grasp of this very important formula can be gained through some minor surgery upon it. First note the meaning attached to each of the symbols:

- x = *value* of a given magnitude resulting from the process of measurement
- p = *probability* that a given value of magnitude (x) occurs in the population
- π = 3.1416 (approximately), the well-known symbol for the ratio of the circumference of a circle to its diameter—a "pure" number having a constant value
- e = 2.7183 (approximately), the number which forms the *base* of the so-called *natural logarithms*—also a "pure" number having a constant value
- μ = the value of (x) which occurs most frequently in the *population*. The symbol (μ), therefore, represents the value of (x) corresponding to the maximum (y) value at the "top of the hump" of the curve.
- σ = the *standard deviation*. This is a number which tells how widely scattered the data values are, in general, about the mean (μ). It is, therefore, a measure of the over-all *variability* of the population.

The formula is variously called *the normal distribution*, *the normal error curve*, and so forth. In the present instance, it expressly deals with the distribution of the measurement *values* (x) which themselves make up the population of all possible measurement values resulting from an endless repetition of a given measuring process. It is termed, therefore, the *normal distribution* of *values*.

As will be seen, one may, in a perfectly analogous fashion, speak of the *normal distribution* of *means*, the *normal distribution* of *differences* between *means*, and so forth.

The relationship which exists between all such distributions is a central idea in the theory of statistics. Avoiding mathematical details, one may summarize the following results of statistical theory which are basic to practical methods of calculation. Referring to the formula:

> The probability of a value of magnitude (x) is the same as the probability of its deviation ($x-\mu$) from the mean of the population.

The importance of considering the probability of occurrence of (x) in terms of its deviation ($x-\mu$) is that this emphasizes the relationship that the occurrence of (x) holds to all values deviating from (μ) within the *whole* population. This emphasis is explicitly recognized in the formula by the ($x-\mu$) used in the exponent of the formula. Again, referring to the formula:

> A deviation ($x-\mu$) is divided by (σ), the *standard deviation*; this operation achieves an estimate of the relative variability of *the deviation* with reference to the *standard deviation* (σ) of the whole population.
>
> The *probability* (p) for any given magnitude of the deviation ($x-\mu$) within a population of variability (σ) is read from a table originally derived through calculations utilizing the *distribution function*.

More briefly, the above results, derivable from a mathematical consideration of the normal distribution curve, achieve the following practical effect: A given statistic, calculable from the raw data, is determined together with an estimate of its variability. The *degree* of variability of the statistic is estimated by comparing its magnitude with its own estimated variability (as a ratio), and this comparison is evaluated as a *probability* by means of suitable probability tables. Probability tables are, as previously noted, constructed by calculations utilizing the appropriate distribution function.

The discussion embodied in this section is developed only for the purpose of giving some general insight into the mathematical results of statistical theory. The reader will gain the greatest intuitive comprehension of this section when it is compared in Part II with the detailed mode of carrying out calculations and examples are presented. A "verbal" type of example may aid somewhat, however, in clarifying the over-all objectives, for instance:

(a) The significance (or reliability) of some quan-

[4] This formula will not be employed directly by the reader, but an understanding of what it embodies is essential to an intuitive grasp of statistical methodology. Actual probabilities (p) derived originally from infinite series representations of this formula are already summarized in tables for ready use. Such practical considerations will be dealt with later.

tity is to be determined, such as, the difference (d) between two means.

(b) An estimate is determined of the over-all variability of the population of which the given quantity is an *individual*,[5] e.g., the estimated over-all variability of the *population*[6] of differences (d) between means is denoted by (s_d).

The quantity is compared with its variability as a ratio, e.g., $\left(\frac{d}{s_d}\right)$ in the case of the difference between two means. This ratio represents a *relative* variability, and its corresponding *reliability* may be read off directly from a table (originally derived from the distribution formula) as a probability, i.e., for $\left(\frac{d}{s_d}\right)$ as a *normally* distributed variate, one uses the Table of *c*.[6]

In short, one estimates the reliability of a given quantity (*d*) by comparing it with the estimated variability of its own population (s_d). The *comparison* is made by determining the ratio $\left(\frac{d}{s_d}\right)$ which is then translated into a *probability* by means of a table.

With reference to the over-all approach presented here, it must be remembered that the ratio, e.g., $\left(\frac{d}{s_d}\right)$, may or may not be normally distributed. If it is not normally distributed, other appropriate tables are used in looking up the probability, e.g., a *t*-table for *t*-distributions, or a χ^2-table[6] for χ^2-distributions. Ways of determining just which distribution a given ratio represents are extremely important and will be considered subsequently in Part II of this series.

PARAMETERS AND STATISTICS

In the previous section, it was noted that π and *e* are constants, and, therefore, yield no difficulty in interpretation. The numbers (μ) and (σ), however, may be only *approximated* by means of a sample. The reason for this limitation goes back to the discussion of population and samples, in which it will be recalled that a *sample*, which is all that the investigator ever has, must be his basis for calculating the nature of the *population*. The symbols, (μ) and (σ), therefore, are used only in speaking of the population and are termed *parameters* while the symbols ($\bar{x}$) and (s) are reserved for those quantities which *estimate* (μ) and (σ) and which, therefore, the investigator obtains from calculations based upon the values contained in the *sample*. Hence, quantities like ($\bar{x}$) and (s) which are merely estimates are termed *statistics* since they only approximate the true *parameters* of the population, (μ) and (σ).

This relationship between parameters and statistics is summarized:

> The *population* holds a relationship to the sample such that the *parameters* of the population (μ) and (σ) are *estimated* from the sample by the calculation of statistics ($\bar{x}$) and (s).

Thus the technical meaning attached to the term *statistics* is quite different from its popular meaning, e.g., columns of figures relating to the stock market, mortality, and so on. These may be *treated* statistically but they, as such, are *not* statistics in the technical sense.

DEGREES OF FREEDOM—UNRELATED AND RELATED SAMPLES

(a) Consider a sample made up of (n) experimental values.

(b) Assume that the mean value of the sample is ($\bar{x}$).

(c) Then, how many of the data values in the sample could have been different, and yet have resulted in a sample having the same mean value ($\bar{x}$)?

This is an important question since it emphasizes the idea that different samples of the same size should estimate the character of the population equally well. A little reflection shows that no matter how greatly one altered the individual values of a given sample, the mean would remain the same *provided* a single value remains for "compensation" purposes. It is in this sense that the following statement is made:

> A sample of (n) values has (n−1) *degrees of freedom* with respect to its mean, because (n−1) values are *freely* alterable *provided one* remaining value can be fixed appropriately.

There are, of course, various methods of sampling according to different experimental situations which, in the light of the above idea, must be considered separately. The most common are:

Situation 1 (*unrelated samples*)

> (n) individuals (people, animals, and so on) are treated in a Circumstance-A and the results are compared with (m) individuals (serving as controls) which are treated in another Circumstance-B. Circumstance-A differs only in some prescribed essential(s) from Circumstance-B.

Situation 2 (*related samples*)

> (n) individuals are compared with themselves in two different circumstances. Thus, any given individual is his own control in passing from Circumstance-A to Circumstance-B. This implies that the Behavior-A of the

[5] In this case, the quantity (d) is an *individual* because it may be thought of as only one of many (d)-values of *a population of all* (*d*)-*values* obtainable from an indefinite number of samples. In actuality, of course, only one sample is necessary for the calculation of (d), since its variability (s_d) can be estimated from the variability of the original sample values. This section should be re-read after working through Part II and its accompanying examples.

[6] Such tables are not reproduced in this discussion, since they are readily available in most statistical texts and in the bibliography of tables which will be listed at the end of Part II of this series.

individual will vary only in a *random* fashion from his Behavior-B, *except* for changes caused by prescribed difference(s) in treatment.[7]

There are extremely important differences in experimental design between the two above situations. First, *Situation 1* involves a far safer type of hypothesis as to the nature of the samples. That is, it allows for a systematic but unrecognized difference in the experimental and control groups. The second situation is, however, often to be preferred, e.g., for economic reasons, if previous experiment has indeed established that a given individual can be properly used as his own control. Actually, *different* individuals may be used jointly in the Situation 2-type of comparison if it has been established that the individuals are *essentially similar*.[8]

The above differences in experimental design are taken into account by the calculation of their respective *number* of *degrees of freedom* as follows:

Situation 1 (unrelated samples)
n−1 for the experimental group
n−1 for the control group
2n−2 for the whole situation
Situation 2 (related samples)
(n) individuals of the experimental group, each paired with himself or an essentially similar alternate so that there are still (n) complementary differences, or only (n−1) degrees for the whole situation.

The calculation of the correct *number* of *degrees of freedom* for any given experimental situation is of great importance, since it determines the type of distribution tables to be used.

[7] It is intuitively clear that an individual serving as his own control will yield a degree of *correlation* (term to be technically defined in Part III; for intuitive purposes, its common connotation will be sufficient here) between Circumstances-A and -B not observable in Situation 1. It is extremely important to know whether such a correlation between the control and experimental data exists. As will be seen in the examples following Part II, rearrangement of the values does not alter a true Situation 1-type of experiment, whereas it does modify greatly a Situation 2-type of experiment. This problem will be dealt with further in Part II under the discussion of "variance."

[8] One *must* settle in his mind whether the samples are related or unrelated, for the two situations are very different and the result of statistical analysis carried out as Situation 1, which is in reality a Situation 2, will be quite spurious. The question of whether samples are related or not in given cases is often so dependent on specific technical knowledge of the field of application that it cannot be dealt with here in detail.

Menu Standardization

At Denver General Hospital, menu standardization has been instituted whereby for patients we have only one week's menus, using a variety of food which is well accepted by the majority of people and which is easily obtainable and moderate in cost. The plan was begun after a restaurateur commented on hospital food service. He wondered why dietitians try so many varieties of dishes when the average stay for patients is so short. He felt that one set of menus, well balanced and popular, should suffice.

When the idea was first broached, I threw up my mental hands in horror. For years I had felt that the cardinal sin of menu writing was repetition of a food week after week on the same day of the week. However, the more the idea was discussed, the more the advantages seemed to outweigh the disadvantages, and it was decided to try the idea.

Have you ever considered how little your meals vary at home from day to day? There are only sixteen easily obtainable vegetables for cooking, including three kinds of beans—green, wax, and Lima—and several "gas-producing" vegetables, which are restricted for many patients. There are fifteen fruits, many of which are seasonal, such as melons. Meat choice is limited to twelve types, including fish, poultry, and smoked meats. With fourteen meals a week—seven lunches and seven dinners—the variety is soon gone. Also, in soft diets, it is difficult not to use the same vegetable in a three- or four-day period.

We anticipated an advantage in food production, also. Dietitians would have more time for thorough training and supervising of employees, standardizing recipes, and improving those already standardized. And it was only reasonable to visualize cooks doing better work with a few familiar, excellent, well standardized recipes than with an endless variety of new procedures.

We have also found that our buying procedures have been more standardized, which in turn helps control costs because suppliers can rely on uniform orders.

We first started the plan with two weeks of menus, then revised it to cover only one week. The menus have been rewritten several times as we discovered improvements or eliminated foods which proved to be too seasonal or not as popular as we had thought.

We do not intend to standardize menus in the pay cafeteria for employees or for tuberculous patients, for they stay with us for long periods. However, the basic menu for patients is incorporated in the cafeteria menu, and the food for the tuberculosis group is adapted from this.—*Louise Poley, Director of Dietetics, Denver General Hospital, writing in The Prospector, Bulletin of the Colorado Dietetic Association.*

Corn Meal Enrichment[1]

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WITH the ever-increasing awareness of the place of the United States in the world, Americans are brought face to face with the fact that a majority of the people of the world are always underfed. The drama of famines of the Orient can be understood and grasped, but it is more difficult to understand the fact that two-thirds of the world population has deficiencies of one or more of the necessary nutritional constituents. These deficiencies may range from the minor deficiencies with no clinical manifestations to those of gross malnutrition, which are evident even to the untrained eye.

From prehistoric times grain products have been the staple food of human beings. It is thought that the ease with which grain is preserved and the necessity for the cultivation of grain have helped to transform nomadic peoples to stationary peoples who began to build their cultures as they settled down. The greater part of the world's population uses either wheat or rice as staple grains.

CORN CONSUMERS

Inhabitants of many countries, especially those of the temperate zone, depend to a great extent on corn, barley, and rye as their main grain supply. In the United States, corn is used primarily as a feed crop, only 5 per cent of the corn crop being used directly as human food (1). However, in the South, it is a significant food crop, as it is in Mexico, Central America, certain countries of South America, Egypt, South Africa, Italy, and the Balkan states.

It is the economically underprivileged who use corn in large quantities as a human food. The poorer, more remote, more agrarian sections of the country consume grains as food while in the more advanced, richer sections grains are used as a feed for livestock to furnish supplementary animal foods. However, this practice is not economical of calories and protein, since it requires 3 to 10 lb. grain to produce 1 lb. meat or animal products. When the food margin for survival is low, the people tend to eat the grain rather than feed it to livestock. Thus the recognized fact is emphasized that in times or areas of deprivation, individuals fall back on grain as the basic calorie-and-protein-producing food. Parallel to high grain consumption go certain nutritional deficiencies, i.e., in the rice-eating populations, beriberi; in the corn-eating populations, pellagra.

By nature, corn is a cereal that tends to produce pellagra unless the diet is rich in other sources of niacin. The niacin content of corn is low compared with that of other grains, and the proteins of corn are especially deficient in tryptophan. In the absence of this amino acid and with a low intake of niacin, pellagra quickly develops. A quarter of a century ago pellagra was a very common disease in the southern part of the United States, and there are still some cases of clinical pellagra to be found. However, its occurrence is far less common today, due in part to the enrichment of flour, bread, and corn products, and in part to a somewhat better general diet, as a result of increased income and a higher standard of living.

In Mexico, Egypt, Guatemala, Venezuela, Colombia, Ecuador, Peru, South Africa, Yugoslavia, and Italy, where corn consumption is high, the incidence of pellagra is also high, although not uniformly so. There is a relatively low incidence of pellagra in Mexico and Guatemala, in spite of a high consumption of corn, in contrast to that in other countries where corn is used in large amounts. Presumably the character of the remainder of the diet is partly responsible. Perhaps the mode of preparation of corn with lime water makes the tryptophan and/or niacin more available. Possibly the varieties of corn used have a higher tryptophan content than those of other areas. In South Africa, the deficiencies of a high-corn diet reflect themselves in a prevalence of kwashiorkor in children as well as pellagra in adults.

[1] South Carolina Experiment Station Technical Contribution No. 209. Received for publication February 19, 1953.

[2] The author is grateful to Dr. R. R. Williams for helpful advice and to the Williams-Waterman Fund for grants to help finance the project described here. The South Carolina Agricultural Extension Service and other state agencies played a large part in putting the program across.

Since World War I, biologic chemists and others have tried to evaluate and improve the nutritional status of the peoples of the world. In the United States, reputedly the best fed nation in the world, large percentages of certain population groups have been found to be deficient in vitamins, minerals, proteins, and in some areas, even in calories. Despite efforts toward dietary education; despite the prevalence of vitamins sold over drug store counters; despite increased income, there are still certain groups in the United States who will not or cannot improve their nutritional status. It is to these groups that cereal enrichment should be of most benefit. The enrichment of corn meal is peculiarly applicable in the southern United States, apart from the general enrichment of other cereal products throughout the nation.

When corn is degerminated, the vitamin and mineral contents are lowered; however, this does not make as striking a difference in the case of corn as it does in the milling of wheat into patent flour (2) or the milling of rice (3–5). From the standpoint of public health, the main consideration is that corn meal is a suitable carrier for nutrients which are otherwise deficient in the average dietary.

Where the preparation of corn from the original shelled grain is done in the home by the housewife, as is generally the case in Mexico, Guatemala, Ecuador, and Peru, its enrichment is impractical because this would require the intelligent cooperation of every family. But, where the corn is ground in power mills, opportunity exists for improving the diets by enrichment of corn products, even though the mills are small and primitive.

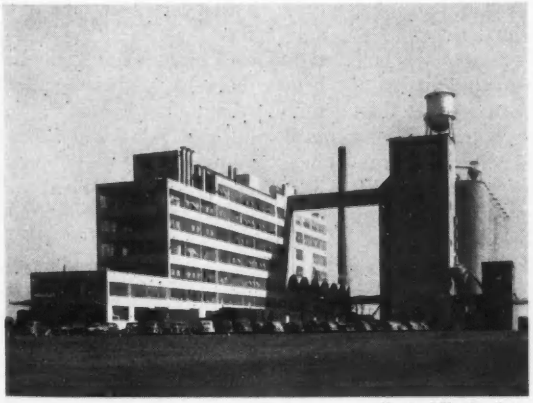
Niacin is among the cheapest and most stable of the vitamins, and it is easy to manufacture in large quantities. It is obtainable from the nicotine of tobacco waste or from quinoline of coal tar and, therefore, might be produced in countries where chemical manufacture is limited. The minimum daily requirement of niacin can be supplied for about 3 cents per person per year. The minimum daily requirements of iron and calcium (as pure powdered limestone) can also be supplied for about this same cost.

CORN MILLING INDUSTRY IN THE UNITED STATES

Our corn milling industry today consists of a few relatively large mills in the "corn belt" of the central United States (*Fig. 1*) which produce degerminated corn meal and grits[3], and some eight thousand little "cross-roads" mills in the South (*Fig. 2*) which produce largely whole corn meal. Few of the southern millers produce degerminated products. In stone grinding whole corn meal, the shelled corn is run through stone buhrs or corrugated steel rolls. Some "top runner rock mills" in this country have been in operation for a century. Both degerminated and whole corn meal are used in the South in approximately equal amounts, although the proportions vary widely from area to area and from year to year.

Corn meal from the degerminated grain is more stable to heat and less affected by insects than the whole grain product. Most people do not realize that insects and rodents are not easily kept out of corn in warm climates. The fact that these pests eat out the embryo of the corn kernel as well as contaminate it should be considered in attempts to improve nutritional quality.

[3] "Grits" is the common name of a very coarse meal, the particles of which have dimensions of 1 to 2 mm. In large sections of the South, grits are a staple food and often fill the place of the Irish potato in the North.



General Foods photo

FIG. 1. *Large mills of this type are located in the central part of the United States, where most of the nation's corn is grown. Their degerminated corn products are used for corn flakes, brewing, general industrial purposes, and shipment to the South for use as grits and meal.*

FIG. 2. *Mills of this size and smaller are found in the South today. Using water power, they grind nearby farmers' grain into feeds and corn meal. They are often operated part-time by one man who grinds on a toll basis. Hand labor is needed for almost every operation.*

CORN MEAL ENRICHMENT IN SOUTH CAROLINA

The movement for the enrichment of corn meal in the United States began on October 1, 1941. The foundation was laid by the Food and Nutrition Board of the National Research Council with the resolution "that at present the committee favors appropriate enrichment of flour and bread [and perhaps corn meal]. . ." This resolution was based on scientific data which indicated that certain vitamin and mineral deficiencies were prevalent in the nation and especially so in the low-income groups of the South (2). Extended testimony to this effect had been introduced by R. M. Wilder, W. H. Sebrell, Norman Jolliffe, Hazel Stiebeling, R. R. Williams, and others at hearings on standards, under provisions of the federal Food, Drug, and Cosmetic Act. The major vitamin deficiencies were niacin, riboflavin, and thiamine. Testimony was also entered as to the prevalence of anemia which might be prevented by additions of iron to the dietary. Also, at that time, commercial quantities of these vitamins were becoming available at prices which were no longer prohibitive.

In South Carolina, a nutrition committee composed of representatives of state agencies, industries, and public-spirited citizens was appointed by the governor to do something about malnutrition. This statewide committee faced squarely the fact that fixed food habits and low incomes would be major factors in preventing changes in family diets (6). In 1942, the committee recommended a law requiring that all white flour and white bread be enriched. The law was enacted, and the South Carolina Department of Agriculture was given the responsibility of administering it.

Enacting a similar law for the enrichment of corn products, however, was not so simple. Corn, although consumed in large quantities as a human food (75 lb. [34 kg.] per person per year), is not sold or eaten in one standard form as is flour or white bread. The corn products eaten in the largest quantities are degerminated corn meal, whole grain corn meal, and corn grits, each of which requires its own method of enrichment.

SOUTH CAROLINA LEGISLATION PROTECTS CONSUMERS

Nutritionists expressed their feeling that the cheapness of corn meal made it doubly important that it be enriched, because the poorer segments of the population consumed most of it and were more subject to vitamin and mineral deficiencies than privileged groups (7–10). The South Carolina State Nutrition Committee also agreed that the interests of consumers are protected and millers are placed on a more uniform competitive basis by enactment of enrichment laws. At the earliest possible dates, enrichment laws were enacted for flour, bread, and margarine, as well as for corn products. Enforcement of these laws has been rigid. Samples are collected regularly by official inspectors and analyzed in the laboratories of the Commissioner of the state Department of Agriculture, who is charged with the duty of enforcement. However, a cooperative approach has been used and gratifying compliance has been obtained.

With the development of satisfactory methods, and with adequate education, legislation requiring enrichment of all types of corn meal intended for human consumption was viewed as a goal. In 1943 the State Nutrition Committee recommended and the legislature enacted a law *requiring* the enrichment of all *degerminated* corn meal and grits (11) and *requested* small local mills that produced *whole ground meal* to enrich this product voluntarily. Compulsory action did not then apply to whole corn meal made by small mills, as it was deemed impractical to enforce such a provision. Thus the law was written to apply only to degerminated grits and meal, the major portion of which is produced by a few large northern mills.

EDUCATIONAL PROGRAM

Education was considered most important in laying the groundwork for legislation on corn meal, and the South Carolina State Nutrition Committee felt that it would not be ready to sponsor legislative action pertaining to *all* corn products until the majority of local mills were voluntarily enriching corn meal.

A long-time educational program on the merits of enrichment was, therefore, undertaken. Extension Service personnel, county health officers, practicing physicians, women's club leaders, dietitians, home economists (12), and others were familiarized with the project. Substantial financial aid in this work was provided by the Williams-Waterman Fund for Combat of Dietary Diseases of the Research Corporation, New York City.

School teachers, county and home agents, public health workers, and others included improvement of corn meal in their regular teaching programs.

The South Carolina Experiment Station at Clemson Agricultural College produced and distributed to the small millers who grind whole corn meal the enrichment equipment and mixture on a nonprofit basis (see below). Specialists of the Agricultural Extension Service undertook to persuade millers to buy the equipment and mixture. The corn miller was visited by the Extension Service agent and often by club women, nurses, or physicians.

The educated and more progressive of the millers offered no objection to enrichment of corn meal, and most wanted to improve the corn meal they ground. However, they did not hesitate to make it clear that they would put the material into the corn meal only if their customers wanted it, or if they were required to do it.

If a miller decided to begin enrichment, he purchased the equipment at a nominal cost from Clemson College. A light panel truck driven by an experienced mechanic then stopped at the mill, and the mechanic helped the miller with the installation and familiarized him with the operation of the enrichment feeder. The miller also purchased some of the enrichment mixture which was compounded at Clemson College.

Simultaneously with the installation of enrichment feeders in a county, a publicity program was conducted which brought to the attention of the residents the fact that the mills were beginning to put the vitamins and minerals into corn meal. This was done by articles in the newspapers, by radio talks, and by distribution of Clemson College publications (13, 14). The subject had to be kept before the public for some time by occasional newspaper and business paper articles, by mention at agricultural meetings, and by other methods in order that the miller would not lose interest and discontinue enrichment. Exhibits were shown at county fairs (*Fig. 3*) and other large meetings.

It was pointed out that enrichment was really a new name for an old process, because the addition of iodine to salt, vitamin D to milk, and minerals to poultry feeds are in reality all old and well established enrichment processes. Enrichment is, therefore, another step in the right direction toward better nutrition and has been portrayed in this way in the South's corn enrichment program.

A motion picture, "Making a Good Food Better," was made at Clemson College to depict corn enrichment in its proper place in the general nutrition program. It is available for use without charge from the Visual Aids Department of the College. It is widely recognized by nutritionists as an outstanding educational film. Numerous prints have been purchased by health departments and the Extension Service for use in the United States and foreign countries.

Thus, during the five years from 1943 to 1948, a feeling developed that a law requiring enrichment of whole ground corn foods would be beneficial to progressive millers and consumers alike. The 1943 law, which required only the enrichment of the degerminated corn products, was broadened in 1949 to cover *all* corn products for use as human food (15) in South Carolina. Enrichment of whole corn meal is now becoming routine to the small millers, and its cost of about 6 cents per 100 lb. is considered a fixed production expense of all mills.

ENRICHMENT MIXTURE FOR CORN PRODUCTS

Grits and degerminated corn meal, like white flour, have undergone a refining process which removes most of the vitamins and minerals. Although whole corn meal has none of the vitamins and minerals removed in grinding, the corn is notably below whole wheat in vitamin and mineral values. The incidence of pellagra tends to be high, where corn products, whether whole or degerminated, are consumed in large quantities. Enrichment of corn products with vitamins and minerals to the approximate level of whole wheat and enriched wheat products was, therefore, deemed desirable.

Because a large percentage of the housewives in the South habitually wash grits before cooking, enrichment mixtures, such as those used for flour, would be washed out before cooking. At Clemson College, a mixture was, therefore, developed for the enrichment of grits which would not wash out during the rinsing process, yet would dissolve during cooking. This premix is insoluble in cold water but readily digestible when consumed (16).

A satisfactory way to accomplish this was found to be to place the enriching ingredients on the insde of particles the size of grits in such a way that rinsing would not cause a loss of the added vitamins. To give the desired vitamin and mineral potency, 2 oz. are mixed with 100 lb. ordinary grits. This formula, worked out on an experimental basis, is available to any miller desiring to use it.

However, since almost all of the degerminated grits and corn meal are milled in the North, where the large processing plants have their own technically trained personnel, a greater need was felt for help for the small southern millers who produce the whole corn meal locally.

To this end, a premix adapted to their type of operation was also developed. Since all types of corn meal contain an appreciable amount of very small particles, the addition of a uniform amount of powdered enrichment mixture with the meal (17, 18) can be accomplished without serious segregation or change in texture. Because corn meal,

FIG. 3. *An exhibit shown to thousands at county fairs by Agricultural Extension Service agents who personally explained the corn enrichment process. Thousands of people received sample packages of enriched meal, thus learning that enrichment does not change the taste or cooking quality. It will be noted that the program includes storage, grading, cleaning, and enriching of corn.*

like wheat flour, is not subjected to washing before cooking, a powder is suitable in contrast to the pellets used for grits.

In view of the fact that calcium is so often deficient in diets, it seemed important to include calcium in the enrichment mixture, as well as iron and the vitamins, thiamine, niacin, and riboflavin. Analyses show that corn meal contains only about 50 mg. calcium per pound; however, its phosphorus content is many times greater. Limestone of special purity was found to be the most practical source of calcium for diluting the vitamins and iron to the concentration of premix adapted to small mills.

Granulations passing through a 200-mesh and over a 300-mesh (holes per square inch) screen proved best. This finely granulated limestone, together with 5 per cent tricalcium phosphate and 1 per cent talc, produces a free-flowing, non-caking enrichment mixture medium into which thiamine, niacin, riboflavin, and iron (as elemental iron or ferrum reductum less 300-mesh) can be incorporated.

In compounding the enrichment mixture, a concentrate is first made, which in turn is reduced in concentration by mixing with limestone to give the finished enrichment mixture. The concentrate is prepared by mixing 55 lb. (25 kg.) niacin, 2.2 lb. (1 kg.) thiamine mononitrate, 6.6 lb. (3 kg.) riboflavin, 50 lb. (22.7 kg.) iron, and 50 lb. (22.7 kg.) talc. To give the finished enrichment mixture, 41 lb. (18.6 kg.) of this concentrate are mixed with 600 lb. (272.7 kg.) of the special limestone.

Clemson College produces and distributes this mixture for enriching whole corn meal to small mills in the South as a nonprofit service, and as such has made a material contribution toward combating dietary diseases. The price of the enrichment mixture is 24 cents per pound. Two oz. are added to each bushel of whole corn meal as it is being milled. Therefore, the ingredient cost for enriching a bushel of corn meal is 3 cents; for 100 lb., only 6 cents, and adds to the vitamin and mineral contents the amounts shown in Table 1.

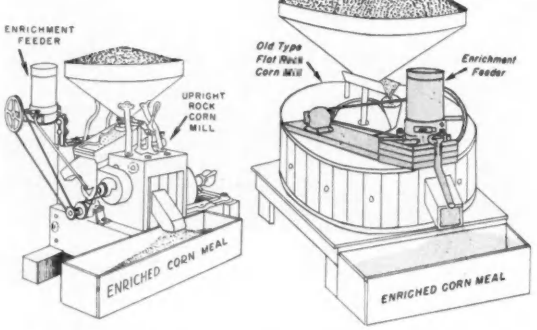


FIG. 4. *These mills are the types commonly used in the southern United States. Enrichment ingredients are fed into the stream of corn as it is being ground.*

ENRICHMENT FEEDERS

The process of enrichment in flour mills involves the use of percentage feeders which add a specified stream of premix into a specified stream of flour. In large corn mills, the same thing can be done with corn meal. Such large mills usually have technically trained personnel who are familiar with foods regulations (*Fig. 1*) and can direct the operation competently. However, in most of the southern states, corn meal is ground by small stone mills, often water powered (*Fig. 2*). The large number, small size, and remoteness of these mills, as well as a lack of technical training of the millers (often laborers), call for special measures.

The South Carolina Experiment Station developed an attachment, called the enrichment feeder, specifically for such small mills. This attachment adds the enrichment premix to the corn meal. The usual practice is to feed continuously a small stream of the premix into a fixed stream of the meal. On many installations, particularly those of the upright rock mills, the regulated stream of premix is fed into the shelled corn as it goes into the mill. In other cases, batch mixers are used to blend the enrichment into the meal.

The enrichment equipment most commonly used consists of a small feeder driven by a round or V-type belt (*Fig. 4*). It contains an impeller which rotates past an adjustable opening where the premix is discharged by agitation and the outward sweep of the impeller blades. Millers often install their own enrichment feeders, after ordering them from Clemson College, which distributes them also on a nonprofit basis for $24.

Power to turn the feeder is usually obtained from a nearby rotating shaft. This has the advantage of starting and stopping the feeder simultaneously with the mill. In some cases a ¼-h.p. electric motor is used to turn the enrichment feeder (*Fig. 4*). This has the advantage of easy installation and fingertip control by the miller. In either case, the tiny stream of enrichment premix must be carefully regulated in proportion to the output of the mill.

ENRICHMENT IN OTHER STATES

While the movement began in South Carolina, it has been extended to other southern states by essentially the same means (19, 20). Four other southern states—North Carolina, Alabama, Mississippi, and Georgia—enacted laws between 1943 and 1948 requiring all degerminated corn meal and grits sold within their borders to be enriched. Similar programs are being contemplated elsewhere. Today a consumer purchasing degerminated corn meal and degerminated grits anywhere in the South is likely to receive the enriched product.

Three years' experience in South Carolina with the enforcement of legislation requiring the enrichment of *all* corn meal sold (whole, bolted, and degerminated) indicates that millers do not object to such legislation. Consumers are not adversely affected, since enrichment does not change the taste or cooking qualities, and they are grateful for the enrichment laws which protect their purchases and health. When the majority of leading mills are enriching and the majority of leading citizens are informed about the merits of enrichment, enactment of laws in other states requiring enrichment of whole as well as degerminated corn meal will be a natural follow-up. Progress is being made, and about 25 per cent of the whole corn meal sold in the South from retail shelves is now enriched. Clemson College is continuing to provide enrichment equipment and premix at cost to several states. As of July 1, 1953, Clemson had compounded and distributed a total of 160 tons (145,500 kg.) of premix to small mills in the South.

STANDARDS

In 1946 hearings on standards for corn meal enrichment were held in Washington, D. C., and were attended by nutritionists, government officials, corn millers, physicians, and other interested parties. This resulted in promulgation of federal standards which did much to make requirements uniform throughout the country and to protect the consumer as well as guide him in the intelligent purchasing of these foods. While the federal standards and definitions of food products govern only those foods shipped from one state to another, the states which have enacted corn meal enrichment laws have included those standards in their laws (Table 1).

FUTURE TRENDS

The need certainly continues. While recent expansion of industry in the South has raised the family income of thousands of the poorer class to a much higher level, many spend their money for automobiles, electric stoves, refrigerators, television sets, and wearing apparel rather than on the kinds of food which will give them a nutritionally adequate diet. Sweets and carbonated beverages also have a high priority for the dollar, and their sugar content further dilutes the protective foods of the diet.

Probably half of the smaller mills will discontinue operation during the next twenty years because modern roads and trucks make it possible to transport corn to distant centers where modern machinery can be profitably installed. The larger mills are likely to continue to enrich their corn products because it is their general policy to produce superior products. Thus, as a greater proportion of corn is milled in the larger centers, an even larger portion of the corn for human consumption in the United States will be enriched.

If corn meal enrichment were extended to other areas of the world, each country would need to work out its own type of enrichment; however, with the pattern already set up in the southern United States, the problems should not be insurmountable.

TABLE 1

Enrichment of whole corn meal

NUTRIENTS	MINIMUM ENRICHMENT STANDARD†	ADDITION NECESSARY*
	mg./lb.	*mg./lb.*
Thiamine	2.0	0.4
Niacin	16.0	12.0
Iron	13.0	8.0
Riboflavin	1.2	0.8
Calcium‡	500.0	450.0

* Premixes are so compounded that 10 per cent more than the minimum amounts of vitamins are added to allow for fluctuations and to provide a margin of safety.

† This standard applies also to enriched degerminated corn meal, corn grits, and white flour.

‡ Optional ingredient.

SUMMARY

The enrichment of corn meal and grits in the southern part of the United States is becoming more widespread. In South Carolina, enrichment of all types of corn meal and grits that are sold has been mandatory for several years.

Clemson Agricultural College compounds an enrichment mixture for whole corn meal and distributes it to small corn mills in the South. This college also has designed and is manufacturing and distributing enrichment equipment suitable for such mills. These services are rendered on a nonprofit basis and are coordinated with an educational program to encourage millers to enrich their corn meal and grits.

Enrichment of corn meal offers an inexpensive method of eliminating pellagra and improving the diets of people in those parts of the world where corn is a staple food.

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Code of Ethics

The following Code of Ethics for members of The American Dietetic Association has been drawn up by a committee of The American Dietetic Association and was presented for the first time to the House of Delegates meeting in Los Angeles on August 24. In a special mailing, each member will receive a copy of this Code of Ethics in October.

A professional person devotes himself to the service of humanity.

RESPONSIBILITY TO THE PROFESSION

The dietetic profession is concerned with the maintenance and improvement of human nutrition. The first obligation of each member of The American Dietetic Association is to render service for the common good, without regard to personal gain. In this rapidly advancing field of knowledge, it is essential that each member continue to read, study, and *apply* the principles of nutrition.

RESPONSIBILITY TO THE ASSOCIATION

The American Dietetic Association is concerned with the development of high ethical standards within the profession. The Association provides prestige for its members, and, therefore, deserves the enthusiastic support of all members, who should participate generously in the activities of the Association.

RESPONSIBILITY TO RELATED PROFESSIONAL GROUPS

Members of the Association should have appreciation of the aims and ideals of related professions. Maintaining harmonious relations with other professional groups contributes to good cooperation and efficiency of work toward common goals.

RESPONSIBILITY TO THE COMMUNITY

Members should be interested in the welfare of the people of the community and should participate in activities in which their knowledge will be of value.

RESPONSIBILITY TO EMPLOYERS OR ORGANIZATIONS

Members should give wholehearted, loyal service to the organizations or agencies by which they are employed, and full cooperation to all associates, in order to fulfill the objectives of their organizations.

RESPONSIBILITY FOR PERSONAL ETHICS

The personal conduct of each member is the criterion by which the individual, his colleagues, and the Association are judged. Integrity, loyalty, and devotion to duty, with high standards of professional skill, are necessary qualities for a worthy member of The American Dietetic Association.

Each member should use the various means of communication in education and publicity in such a way as to preserve the high standards and best interests of the profession.

Enrichment of Whole Ground Corn Meal in Diets of Farm-Operator Families[1]

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AMONG urban families of the South, the use of whole ground corn meal is not as great as is that of degerminated corn meal. For farm families, however, whole ground meal is much more important than is degerminated meal (1, 2).

Laws for the enrichment of degerminated corn meal by the addition of iron, thiamine, riboflavin, and niacin have been enacted only in Alabama, Georgia, Mississippi, North Carolina, and South Carolina. However, voluntary enrichment is practiced to such an extent that nearly all degerminated corn meal sold in the Southeast is said to be enriched (3). Obtaining nearly 100 per cent enrichment was comparatively simple for both the industry and nutritionists since this product is manufactured in a few large mills.

Enrichment of whole ground meal, nutritionally inferior to enriched degerminated meal with respect to all four nutrients used in enrichment, is a more difficult undertaking because of the thousands of small mills that produce whole meal. The invention of an enrichment feeder machine for use in these small mills has made practical a program for enrichment of whole ground meal. County and home demonstration agents in several southern states have sponsored programs for consumers and millers as to the value of enrichment of such meal. These programs have on the whole not brought about active demand on the part of consumers and millers for enrichment of the whole ground product.

Only in South Carolina has legislation been passed which covers enrichment of both degerminated and whole ground corn meal. There it is unlawful for any person to sell or exchange for services or goods any corn meal which does not contain at least the minimum amounts of iron, thiamine, riboflavin, and niacin specified in the federal Standards of Identity for enriched corn meal. The South Carolina law does not require a farmer to enrich the corn meal made from corn grown in his own field and consumed in his own immediate home. However, the law states, "if said farmer desires the health benefits for his family and requests enrichment, the miiler is required by this Act to enrich according to the standard specified."

It is the purpose of this particular analysis to determine what effects enrichment of whole ground corn meal would have had on the nutritive value of the diets of farm-operator families consuming this kind of meal. It was thought that such an analysis would show whether an educational program for enrichment of whole ground corn meal was justified for this and similar groups in the South. It would also give data on which to base an educational program provided need for one was indicated.

SCOPE AND METHODS

The records of family diets used in this analysis were obtained from farm-operator families in Lee and Jones Counties, Mississippi, in connection with a cooperative study of the United States Bureau of Human Nutrition and Home Economics and the Mississippi Agricultural Experiment Station made during the summer of 1946 (5).

Data from International Business Machines cards giving kinds and amounts of foods consumed by each family, nutritive values of their diets, and family data obtained in connection with the study of "Rural Levels of living in Lee and Jones Counties, Mississippi" were used (5).

At the time of the study, Lee and Jones Counties were among those counties in the state with greatest industrialization. Since industrialization is increasing at a rapid rate in the southern region, results obtained in these counties would have special significance for many areas in the South today and in the near future. Although the data refer to 1946, findings probably apply to current conditions. Food habits change slowly, especially when, as in this period, income increases no more than necessary to meet higher living costs.

Eighty-four per cent (361) of the 429 farm-opera-

[1] Published with the approval of the Director, Mississippi Agricultural Experiment Station, as Paper No. 327. Received for publication February 5, 1953.

TABLE 1
Difference in composition of enriched and unenriched whole ground corn meal

NUTRIENT	ENRICHED WHOLE GROUND CORN MEAL*	UNENRICHED WHOLE GROUND CORN MEAL	DIFFERENCE†
	mg./lb.	*mg./lb.*	*mg.*
Iron	13.0	10.9	2.1
Thiamine	2.0	1.74	0.26
Riboflavin	1.2	0.50	0.7
Niacin	16.0	9.1	6.9

* In actual practice millers add enough enrichment to provide a margin of safety above the minimum. No data are available as to how much this margin is for the average enriched corn meal sold.

† The enrichment mixture distributed by Clemson College also contributes 500 mg. calcium per pound.

tor families of Lee and Jones Counties giving information on kinds and amounts of foods used by their family during one week reported that whole ground corn meal was used. Sixty-eight families (16 per cent) did not use whole ground meal during the report week. Thirty-one of these 68 families, however, had had home-produced corn which was ground for meal during the past year, but that supply was used up at the time of the study. This particular analysis is limited to the 361 farm-operator families using whole ground meal during the report week. It is interesting to note that 48 per cent of the 361 families used purchased whole ground meal. In other words, these families liked the whole ground product. When they had no corn for grinding, they purchased whole ground meal from a local miller or some other source. The 68 families using no whole ground corn meal used no meal during the study week.

The quantities of food used were those estimated by the homemaker to have been used in household food preparation during the seven days preceding the interview. Quantities included food that was purchased as well as that produced at home or received as a gift or in return for services rendered to others. Before the nutritive value of the diets was computed, quantities of food reported on the food list were adjusted downward for any quantities reported as not having been eaten by the family such as food fed to animals, spoiled, or wasted.[2]

For this particular analysis, adjustments for cooking losses of thiamine, riboflavin, and niacin which are known to be affected by ordinary cooking processes were made on individual diets. Percentage retention factors were those used in the southern family food consumption study (1).

The minimum enrichment levels for iron, thiamine, riboflavin, and niacin, as specified in the federal Standards of Identity for these four nutrients in corn meal, were used. They are the same specified in the South Carolina law making mandatory enrichment for corn meal of all types sold.

Food composition values published by the United States Department of Agriculture in 1945 (6) were used in calculating the nutritive value of a household's food during the week, except for corn meal. Since values of iron, thiamine, riboflavin, and niacin for whole ground corn meal used in the International Business Machines analyses were somewhat different from those in food composition tables compiled by the Bureau of Human Nutrition and Home Economics in 1950 (7), quantities of these four nutrients in whole ground meal used by each family were recalculated on the basis of 1950 values.

The difference in the iron, thiamine, riboflavin, and niacin content of a pound of enriched and unenriched whole ground corn meal is shown in Table 1.

AMOUNTS OF CORN MEAL USED

Families of this study used whole ground white corn meal almost altogether. Only 8 of the 361 families reported whole ground yellow corn meal. The quantity of whole ground meal used during the study week was 2.4 lb. per capita. No family reported use of whole ground hominy grits. No family used degerminated corn meal and only 3 used degerminated hominy grits.

Whole ground corn meal was somewhat more popular with the 361 families than were plain and self-rising white flours. Per capita consumption of flour was 2.0 lb. per person during the study week.

Two cereal enrichment laws had been passed in Mississippi in 1944. The first was an act to require enrichment of degerminated corn meal and hominy grits and the second, an act to require the enrichment of white bread, white flour, and self-rising flour.[3] From this it is readily seen that the cereal enrichment laws did not cover the most important cereal food used by the 361 farm-operator families in this study.

IRON AND B VITAMINS IN DIETS

The percentage of families meeting the National Research Council's recommended allowances for iron and the B vitamins, thiamine, riboflavin, and niacin[4], was as follows:

Iron	92%
Thiamine	94%
Riboflavin	89%
Niacin	79%

[2] For further discussion of methods used, see "Rural Levels of Living in Lee and Jones Counties, Mississippi, 1945" (5).

[3] Now, flour and bread enrichment is required by law in twenty-six states, Hawaii, and Puerto Rico, and in other states it is widely produced on a voluntary basis. Enrichment legislation was enacted first in South Carolina in March 1942 and in Louisiana four months later. Alabama, Texas, Mississippi, and Kentucky passed enrichment laws in 1943 and 1944.

[4] Recommended Dietary Allowances of the National Research Council per nutrition unit per day are: iron, 12 mg.; thiamine, 1.5 mg.; riboflavin, 1.8 mg.; and niacin, 15 mg.

Figures for the B vitamins were adjusted for cooking losses.

A number of families in the group had large amounts of home-produced food, such as milk, eggs, meat, poultry, fresh peas, and Lima beans. About 70 per cent of the money value of all food used during the study week was for home-produced foods. These were valued at the price the farmer could have received if he had sold them; purchased food was listed at prices paid for it.

The average per capita consumption by the 361 families during the study week is given in Table 2.

The study was made during the summer when production of green leafy vegetables, especially good sources of niacin, riboflavin, and iron, is probably at the lowest level. On the other hand, beans and peas which were in season and used in large quantities are good sources of thiamine. The average amount of fresh Lima beans and peas eaten per person per family was reported to be 3.3 lb. and of green leafy vegetables, 0.3 lb.

It is apparent that most families in this study had quantities of thiamine, riboflavin, niacin, and iron which met the recommended allowances of the National Research Council. This was especially true with families of incomes of $2000 and over, of farm-owner families, of small families, of white families, and of families using $2.00 or more purchased food per person per week. Nearly 100 per cent of the families in these groups met the National Research Council's recommended allowances for these nutrients.

The proportions meeting the National Research Council's allowances for these four nutrients in the "lower socioeconomic groups" were smaller. These lower groups include: families with incomes of $0–$500, farm sharecropper families, families with seven or more members[5], Negro families, and families using less than 50 cents purchased food per person during the report week. There was, of course, some overlapping. The same family may have appeared in the low-income group, the Negro group, and the group of large families. It is the purpose of the next section to show what enrichment of whole ground corn meal would have done for these families.

VALUE OF ENRICHMENT FOR POORER FAMILIES

As will be noted from Table 2, enrichment of whole ground corn meal would have improved the diets of the lower socioeconomic status farm families mainly in respect to niacin, since there were more of these families who failed to meet the National Research Council's recommended niacin allowances than for thiamine, riboflavin, and iron. Also, the amount of niacin added in enrichment would be relatively greater than in the case of the other nutrients. Enrichment of whole ground meal would have especially benefited the Negro family and the family using less than 50 cents purchased food per capita. It would have shifted nearly 20 per cent of the group receiving two-thirds but less than the total allowance into the category receiving 100 per cent of the allowance or more, and 5 per cent of the group with less than two-thirds of the allowance into the two-thirds-but-less-than-100-per-cent-allowance group. It would have improved diets of the other three low socioeconomic groups also, but to a lesser extent (Table 3).

[5] Large families are classified here because they generally have less food per person than small families. See Tables 44 and 80 in reference (1) already cited.

TABLE 2

Average weekly consumption of 361 families which used whole ground corn meal during study week

FOOD GROUP	AMOUNT
Milk and milk products (total milk equivalent)	6.3 qt.
Meat, poultry, fish	1.5 lb.
Eggs	5.4
Tomatoes, citrus fruits	2.0 lb.
Leafy green and yellow vegetables	3.9 lb.
Potatoes (Irish and sweet)	1.7 lb.
Other vegetables and fruits*	16.5 lb.
Grain products (total flour equivalent)	5.3 lb.
Fats and oils	1.5 lb.
Sugars and sweets	1.3 lb.

* In addition, an average of 0.1 lb. per capita of dry peas, beans, and nuts was used. Large quantities of watermelon used by some families was responsible in part for high per capita consumption in this group.

The 285 families who met the recommended allowances of the National Research Council for niacin used an average per capita of 17 lb. milk, eggs, meat, poultry, and fish. The 76 families who had diets that did not meet these niacin allowances used 11 lb. per capita. In other words, lower niacin accompanied lower intake of animal products. As is known, diets with low niacin and tryptophan content (animal products, such as meat and milk, are excellent sources of tryptophan) and considerable amounts of corn meal are pellagra-producing (8–10). Enrichment of whole ground corn meal with niacin would have improved the nutritive value of diets of low socioeconomic status farm families.

PROGRAMS FOR ENRICHMENT OF WHOLE GROUND MEAL

The question might well be raised whether a whole ground corn meal enrichment program is justified under the following conditions: (a) in a farming area where food production for home consumption is the practice; (b) where families have a means of supplementing farm income with income from non-farm work; and (c) where there is already a law making mandatory enrichment of white flour and degerminated corn meal. This is the typical situation in many areas of the South.

This study shows that an enrichment program for whole ground corn meal would be justified if there were low socioeconomic status families in the areas. It is these classes of families (i.e., Negro families,

TABLE 3

Possible effect of enrichment of whole ground corn meal on iron, thiamine, riboflavin, and niacin in diets of farm-operator families of lower socioeconomic status

SOCIOECONOMIC STATUS	PER CENT OF THE 361 FAMILIES	DIETS PROVIDING SPECIFIED PROPORTIONS OF THE NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCES DURING STUDY WEEK					
		100 per cent or more*		67 through 99 per cent*		66 per cent or less*	
		At present	If whole ground corn meal were enriched	At present	If whole ground corn meal were enriched	At present	If whole ground corn meal were enriched
Iron							
		%	%	%	%	%	%
Net income $0–$500	16	89	95	11	5	0	0
Sharecroppers	28	85	90	15	10	0	0
7 or more members	13	77	84	23	16	0	0
Negro	18	87	94	13	6	0	0
Using less than 50¢ purchased food per person per week	22	81	87	19	13	0	0
Thiamine							
Net income $0–$500	16	88	93	12	7	0	0
Sharecroppers	28	86	90	13	9	1	1
7 or more members	13	85	92	15	8	0	0
Negro	18	84	88	16	12	0	0
Using less than 50¢ purchased food per person per week	22	82	87	18	13	0	0
Riboflavin							
Net income $0–$500	16	87	93	11	7	2	0
Sharecroppers	28	85	89	11	9	4	2
7 or more members	13	78	84	20	16	2	0
Negro	18	75	85	21	15	4	0
Using less than 50¢ purchased food per person per week	22	78	91	20	9	2	0
Niacin							
Net income $0–$500	16	76	84	18	14	6	2
Sharecroppers	28	67	84	27	12	6	4
7 or more members	13	68	79	28	21	4	0
Negro	18	56	79	36	18	8	3
Using less than 50¢ purchased food per person per week	22	48	72	44	25	8	3

* Allowances are made for losses in cooking of the three vitamins.

TABLE 4

Use of purchased whole ground corn meal by lower socioeconomic families

GROUP	PER CENT USING PURCHASED WHOLE GROUND CORN MEAL
Net income $0–$500	24
Sharecroppers	25
7 or more members	23
Negro	29
Using less than 50¢ purchased food per person per week	13

families using less than 50 cents purchased food per person per week, sharecropper families, and the like) that a program for enrichment of ground corn meal would benefit, especially in regard to niacin.

A law covering only purchased whole ground corn meal, however, would have affected only about one-fourth of these families, as is shown in Table 4.

As has been pointed out, 48 per cent of the 361 families using whole ground meal used purchased whole ground meal. Mandatory enrichment of whole ground corn meal which is sold would in this case have added nutrients to diets of many higher socioeconomic status families who had no real need for them. It seems unlikely that many families in lower socioeconomic groups would request enrichment by the miller.

Actually, however, experience with enrichment legislation of whole ground corn meal in South Carolina has shown that many millers after they install

the enrichment feeder will leave the belt on the feeder and enrich all the meal they grind. This is particularly the case with large mills which accumulate enough toll grain to sell meal and often buy additional corn for making meal. A number of the very small mills, operating often only on Saturday, do not install enrichment feeders, but such mills are diminishing in number. This trend seems to be taking place throughout the South. Legislation making mandatory the enrichment of whole ground corn meal sold or exchanged for services or goods would, therefore, be worth while. In fact, it seems to be one rather practical approach to improving diets of lower socioeconomic status families in the region.

Community leaders frequently sponsor laws that in the main benefit families in the lower socioeconomic groups. Therefore, sponsoring a law for enrichment of whole ground corn meal is not out of line with usual procedure.

Other factors which make enrichment of whole ground corn meal a practical approach to improving diets of low socioeconomic status families are: (a) Whole ground corn meal is consumed in relatively large amounts as compared with other foods. (b) Enrichment of whole ground corn meal costs very little (about 3 cents a bushel) and, therefore, the price to the family is not increased or increased very little. (c) The use of enriched whole ground meal would not involve a change in food habits and food preparation. Enriched meal looks like and tastes like unenriched meal. One can use the same recipes with enriched as with unenriched corn meal.

SUMMARY

Eighty-four per cent of 429 farm-operator families in Lee and Jones Counties, Mississippi, during the study week used whole ground corn meal at the rate of 2.4 lb. per capita per week, and simultaneously consumed 2.0 lb. flour per capita per week. Essentially no degerminated corn meal or grits was used.

A program for enrichment of whole ground corn meal is justified if there are low socioeconomic status families in the area. Enrichment of whole ground corn meal would have resulted in more of the families of low socioeconomic status in this study meeting the National Research Council's recommended allowances for the four nutrients—iron, thiamine, riboflavin, and niacin—added in enrichment, especially that for niacin.

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A.D.A. Membership

On May 31, 1953, the membership of The American Dietetic Association was 10,228, including 230 foreign members. The membership is classified as follows:

Active members	9,471
Associate members	151
Life members	601
Honorary members	5

Comparative figures for the past thirty years are also interesting—and somewhat amazing—as shown below:

1923	711	1948	8,050
1933	2,839	1949	8,264
1943	5,784	1950	8,557
1944	6,387	1951	9,040
1945	7,021	1952	9,607
1946	7,491	1953	10,228
1947	7,781		

Utility and Economy Factors in Using Prefabricated Meats[1]

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PREFABRICATED meats, frequently called oven-prepared or portion-ready meats, are finding increasing acceptance in institutions. Better portion control, accounting control, reduced costs, inventories and storage requirements, more accurate precosting, and convenience have been advanced as some of the reasons for the use of these meats (1). After a report that these meats would meet the special needs of the submarine, the United States Navy last year purchased over a million pounds (2), and extended use in other branches of the armed forces is contemplated. However, little or no information exists on the utility and economy of using these meats in the average institution. This paper reports a four-week intensive study plus the record of a year's purchasing of prefabricated meats in St. Luke's Hospital, a 580-bed hospital in New York City.

The intensive study was of four weeks' duration, November 5 to December 2, 1951 inclusive, and was divided into two equal parts. During the first two weeks meats were cut by the hospital butchers from primal cuts; prefabricated meats were used exclusively during the second fortnight. The menu of the first two weeks was repeated during the second period with the exception of Thanksgiving Day which occurred in the second period.

The management of the dietary department of the hospital was anxious to improve the meat purchasing to the best of its ability in view of the fact that meat prices were continually rising. From experience it was found that the cuts being purchased had considerable trimmings, bones, and fat which could be utilized (but not always efficiently) or sold (but not always at favorable prices). The butchers were not experienced in cutting even portions of meat and, because of the new pay cafeteria, standard portions were necessary. It was also desirable to keep a better control of patient portions and reduce all unnecessary waste.

Meats in this study included poultry but excluded fish. Meat inventories were taken at the beginning and end of each of the two two-week periods, and these inventories, with purchases, were used to calculate meat costs in each period. The grade of meat used in each period was the same. No significant change in prices at the jobber level, where the hospital purchased meats, occurred during the study. Adjustment was made in the final calculations for differences between the two periods in the number of meals served so that costs would be on a comparable basis.

Currently with the cost accounting study, detailed studies were made to ascertain what specific factors affected the final cost of meat served and to what degree. Fewer meat tests were made in the second period because much of the desired information could be obtained from invoices and receiving records.

One semi-skilled and one unskilled butcher cut all the meats for the hospital. They also stored the meat and delivered it to the four kitchens. Direct labor costs in the first period were obtained by recording the time required by the butchers to cut the meats. This included removing the meat from the refrigerator, taking it to the meat block, portioning it or preparing it for cooking, placing it in pans, and returning it to the refrigerator or placing it on a cart for delivery.

METHODS OF STUDY

The data obtained on each meat test were: weight on the block; weight of meat trimmings, bones, and fat; net weight of the usable meat not including trimmings; AP cost; credits for bones and trimmings; direct and indirect labor costs; and net cost per pound. In calculating this net cost per pound, bones were credited at 5 cents a pound, the price paid for bones purchased in the second period. Excess fat and suet obtained from meats were being

[1] Presented before the Tri-State Hospital Assembly in Chicago, on May 4, 1953.

sold, but the income was not credited to the dietary department in the hospital's accounting system and, therefore, in the study no credit was made for them. Where meats were cut into portions, the number of portions obtained, the average weight of portion, the average cost of portion, and variations in portion sizes were recorded. To ascertain the variations in portion size, random samples were selected as they came off the block and the weights noted. In the second period, variations in portion sizes of prefabricated meats were also obtained by random selection.

Indirect costs were obtained by recording the butcher's time in doing work other than butchering, such as receiving and storing meat; cleaning out refrigeration spaces, sinks, or the butchershop; issuing and delivering meats; and other related tasks. The number of pounds each butcher processed on the block during a day was also recorded. These "pounds processed" were then divided into the cost of the indirect labor to give an indirect cost per pound of meat cut.

Little direct labor cost occurred when prefabricated meats were used. However, one butcher was required during the second period, and much of his time was charged as an indirect cost to the prefabricated meats.

Space required in the butchershop and refrigerators to handle the meats in the two periods was estimated. However, savings made by reduction in space or savings which might result through reduction in purchases of equipment, care, and upkeep were not applied in the study.

In some instances data were obtained on the yields of cooked roasts. These data included: weight before and after cooking, portioning waste, number of portions obtained, average size portion served, and cost of meat served per ounce and per portion.

At the end of the four-week study, key employees of the dietary department were asked their opinions as to the suitability of prefabricated meats in meeting the needs of the hospital.

At the end of 1952, after one year's operation in which a significant amount of prefabricated meat was purchased, an analysis was made between meat costs of that year and 1951, a year (except for the last forty-four days) in which almost no prefabricated meats were purchased. Differences between the two years in the number of meals served and in meat costs were adjusted in the final calculation to arrive at a comparative amount saved. It was judged that operating conditions and menu during the two years were sufficiently alike so that no adjustment needed to be made for these factors.

RESULTS OF STUDY

In Table 1 are summarized the data obtained in the four-week cost accounting study. After adjustment for variation in the number of meals served in the two periods, there was a difference of $451.33 in favor of the second period. It was estimated that if these two periods were typical of conditions which would exist normally, there would be a yearly saving of $11,700. In addition, it would be possible to eliminate one butcher's helper, saving an additional $2,400 per year. Thus, it was predicted that an approximate annual saving of $14,000 could result by using prefabricated meats.

It is impossible to present all the data obtained in ascertaining what specific factors affected the final cost of meat served. Therefore, only selected data will be shown in order to illustrate points which arise out of consideration of the total figures.

Comparative Costs per Net Pound

Much of the original data on the meat and cooking tests were obtained to make valid comparisons between the two types of meats. The meat from primal cuts and prefabricated cuts were considered comparable when they were both ready for cooking. In the case of meats from primal cuts, this was as they were delivered to the kitchens. In the prefabricated meats, for the most part, this was as purchased. At these points, the major costs, such as labor, shrinkage, cutting losses, and so forth, were calculated. Addition of these costs to the original cost of the meat, where applicable, gave the net cost per pound of meat.

A comparison of the net cost per pound of meat favors neither type. Boneless beef stew, shoulder lamb chops, loin lamb chops, loin veal chops, legs of veal, and oven-prepared pork loin roasts were cheaper when cut from the primal cut. Some savings made by purchasing prefabricated meats were in ground beef, oven-prepared ribs of beef, tenderloin steaks, Swiss steaks, and ground lamb. It should be

TABLE 1

Cost of meats in the first and second periods

FIRST PERIOD		
Beginning inventory	$2,739.01	
Meat purchases	6,493.88	
	$9,232.89	
Ending inventory	632.94	
Net cost of meat served		$8,599.95
SECOND PERIOD		
Beginning inventory	$ 632.94	
Meat purchases	8,041.02	
	$8,673.96	
Ending inventory	725.14	
Net cost of meat served		7,948.82
Unadjusted savings, second period		$ 651.13
Adjusted savings, due to 673 fewer meals in second period		$ 451.33

TABLE 2

Average size of meat items ordered and received on one day of test

MEAT ITEM	PORTION ORDERED	PORTION RECEIVED
First Period		
	oz.	*oz.*
Sliced liver	4.0	4.3
Loin lamb chop	6.0	7.1
Strip steak	6.0	7.7
Swiss steak	4.0	5.1
Loin veal chop	6.0	8.0
Ham steak	4.0	4.1
Second Period		
Pork chop	3.0	3.1
Shoulder lamb chop	6.0	5.8
Strip steak	6.0	6.0
Swiss steak	4.0	4.0

TABLE 3

Comparative portion size and cost of meats during the two periods

MEAT ITEM	FIRST PERIOD		SECOND PERIOD	
	Average portion weight	Average portion cost	Average portion weight	Average portion cost
	oz.		*oz.*	
Leg of lamb	2.0*	$ .304*	1.7*	$ .188*
Ground lamb	4.0	.241	4.0	.140
Loin lamb chop	7.1	.435	6.0	.355
Loin veal chop	6.6	.341	5.0	.525
Veal cutlet	4.3	.368	4.0	.343
Ground beef	4.0	.250	4.0	.173
Swiss steak	5.1	.419	4.0	.345
Pot roast	2.1*	.236*	2.0*	.253*
Strip steak	7.8	1.180	6.0	.684
Ribs of beef	2.0*	.466*	2.0*	.365*
Pork roast	2.1*	.246*	2.0*	.240*

* Cooked.

recognized that such savings would not be static in an institution. The net cost per pound as calculated in these studies will vary from institution to institution depending on conditions and from time to time within the institution as yields obtained, market conditions, and other factors vary.

Portioning Data

A comparison of the data on portions indicates that the ability to control the portion size was a significant factor in deciding final portion costs. For instance, strip loin steaks, used in both periods, were equal in net cost per pound, $1.82; yet, the ability to control the portion size to an average 6 oz. in the prefabricated steak compared with a 6.2-oz. average in one test day in the steak cut from loins by the hospital saved 2.6 cents per steak. Even when strip loin steaks cost less per pound in the first period, the ability to control the portion size in the second period saved 3.8 cents per portion on the final cost. Veal cutlets, although costing less per pound in the first period, cost 2½ cents more per portion through failure to control the portion size. At times, variation in portion size was not the fault of the butchers, because the primal cuts obtained were not always suitable for yielding the size of the portion desired. Control in portion size may account for a significant part of the savings indicated.

Table 2 gives selected data illustrating how, on the average, raw meat portions varied from sizes ordered by the supervisors of the kitchens during the first and second periods. In Table 3 are presented comparative data on the size of portion of raw or cooked meat served in the first and second periods and the cost of that portion.

Precosting

The data also indicated that it is very difficult to predict the cost of the final meat portion when such items as chops or steaks are derived from primal cuts. In the first period Swiss steaks cut from rounds varied in net cost per pound from $1.32 to $1.74, although the price paid per pound was constant, 87 cents. In one particular test, high wastes taken in trim and fat on 268 lb. shell loins caused the final cost of the steaks served to be $2.44 per pound. It would have been possible to purchase these same quality steaks prefabricated for $1.86 per pound. Ground beef in the first period varied anywhere from $0.979 to $1.185 a pound. These and other examples indicated that precosting may not be precise when it is based on meats from primal cuts. However, merely purchasing prefabricated meat by name alone will not suffice. In this study, two deliveries of prefabricated bottom rounds increased in price almost 10 cents per pound when they had to be trimmed of excess fat before pot roasting.

Specifications for the purchase of prefabricated meat are not yet standardized in the trade. Certain guides such as "outside fat shall not be over ½ in." and "length of oven-prepared ribs of beef shall not measure over 7 in. from the inside of vertebrae to rib end" are being used, but on the whole there is a need for the development of standard specifications to guide institutions in their purchases.

The fact that prefabricated meat many times has the grade stamp removed by trimming makes ascertaining of grade difficult. This could be eliminated by having a system devised whereby a federal grading stamp on the outside of the package would certify that the meats in the package came from a certain grade of animal. Under the present situation, reliability of the purveyor is most important. Buyers in institutions, by insisting on prefabricated meat which is certified as to grade, will do much to further progress on this problem.

Cooking Tests

The data obtained on cooked meats in the study were difficult to interpret. Too many contradictions existed. Variables in cooking the meats or portioning after cooking, which were not controlled in the study, eliminated any chance of forming conclusions as to the most economical or useful meat.

Labor Costs

During the first period, a total of 120 hr. direct and indirect butchers' time were required to handle the meats used. During the second period, this time was reduced 50 per cent, and indirect costs averaged about 1 cent per pound of meat used. A longer time was required to receive prefabricated meats than to receive the meat in primal cuts. The removal of prefabricated meats from their sealed corrugated, fiberboard cartons and from between layers of wax paper to check net weights and quality is time-consuming.

The time required to store either type meat in the refrigerator was much the same per equal final servings of meat, although the weights lifted at one time and the total weight lifted were much less when prefabricated meats were received. This may be an important factor to consider when women employees are used.

Very little meat cutting occurred in the second period, and most that did occur was that of portioning chicken and cutting out special orders, tasks which required less skill than butchering primal cuts. As a result, direct costs were in many instances eliminated, and many indirect labor costs, such as clean-up, care, and upkeep of equipment and other related tasks, were materially reduced.

Inventories

On an average, about a $2000 to $3000 inventory was carried when the hospital used meats from primal cuts. In the second period, since it was not necessary to order meats sufficiently in advance to give the butchers time to process them, it was possible to reduce the inventory. Furthermore, in the second period the knowledge of the exact number of portions which were available reduced the tendency to have a "little bit more, just in case." The average inventory in the second period was around $700.

Cubic Capacities Required

About 1000 lb. frozen prefabricated meat in its shipping containers required about 20 cu. ft. frozen storage space. This same quantity of chilled prefabricated meat needed about 40 cu. ft. chilled storage space because of additional requirements for air circulation and aisle space. In contrast, 1000 lb. chilled primal cuts required approximately 130 cu. ft., but to obtain approximately the same pounds of primal cuts in storage as represented by 1000 lb. prefabricated meat required about 200 cu. ft.

The working space requirement in the butchershop was reduced about one-third in the second period.

Equipment needs were also reduced. At no time during the second period were the electric saw or the meat grinding equipment used; as a result of the study, the hospital decided it need not purchase a new meat grinder, a purchase previously considered essential. Small tool and equipment use and care were also reduced; the time that a butcher spends in sharpening knives and caring for tools does not seem significant until it is measured.

The importance of some of these data resulting from this study of space and equipment requirements should not be underestimated. While the percentage of prefabricated meat, especially frozen, of total meat sold to institutions is at present very small, its use is increasing very rapidly. A sampling study is presently under way to obtain data on the extent to which prefabricated meats are being used in institutions. Preliminary returns indicate that their use is quite extensive. If this trend continues, institutions will more and more begin to feel the need for different space and equipment requirements.

Issue Control

Since weights and counts of portions in original shipping containers were known, meats were delivered directly to the kitchens in these containers, thus eliminating much rehandling and counting of meat portions. The use of prefabricated meats made it possible also to inaugurate a more efficient system of issue control to the various kitchens.

Employee Reaction

In the main, key employees in the dietary and administrative departments of the hospital reported favorably on the use of prefabricated meats. This was especially true of those employees in the dietary department carrying administrative loads. They felt that work loads in general had been reduced; that portions were more uniform; that quality was good; that cooked left-overs, raw meat trimmings, and waste had been reduced; that portion sizes were more consistent; that precosting was more accurate; and that mechanics of ordering and obtaining quantities required were simplified. Certain of the cooks and dietitians supervising floors were critical. The former stated that prefabricated boned and rolled roasts were difficult to cut in the slicing machine and that much waste resulted when they were so cut. Other criticisms were on quality, size of portion, and certain methods of preparation of portion meats by the prefabricators. One floor supervisor stated, "Portion control is not necessarily enhanced by using prefabricated meats. When items such as roasts, stews, or meat extender dishes are served, the size of portion is still governed largely by the person serving. The type of meat used makes little difference."

Some of the criticism from the cooks may have arisen out of a loyalty to the butchers.

TABLE 4

Comparative meat costs for 1951 and 1952

MEAT COSTS		
1951 (adjusted to include savings made by purchasing prefabricated meats 44 days)	$201,790.31	
1952 (adjusted for differences in meals and prices between 1951 and 1952)	197,267.92	
Savings in 1952		$4,522.29
Savings in 1952 in butcher's salary		2,400.00
Total savings		$6,922.39

A YEAR'S PURCHASING RECORD

On the basis of the data obtained in this study and the voiced satisfaction from hospital employees, it was decided by the management of the dietary department to continue the purchase of prefabricated meats. It was also considered desirable to check the savings, since considerable skepticism was expressed by many that the predicted savings in a year, specifically in meat purchases, would be as large as indicated.

Table 4 summarizes the data obtained in this year's study and compares meat costs for 1951, a year in which very little prefabricated meat was purchased, with 1952, a year in which prefabricated meats in substantial amounts were purchased.

Meat costs for 1951 include an adjustment of $486.64 which was estimated as saved through purchase of prefabricated meats for forty-four days of that year. The meat costs for 1952 include a meal difference adjustment of $4,004.32; fewer meals served in 1952 than in 1951 made this adjustment necessary to make the two years comparable.

According to the wholesale price index of the Bureau of Labor Statistics, U. S. Department of Labor, meat prices including poultry but not fish were, on the whole, lower in 1952 than in 1951. By using figures from this index and weighting them according to usage of meats at the hospital, the price differential between the two years was calculated. This difference amounted to $4,146.44 in favor of 1951 and was added to the cost of meats purchased in 1952 as was the correction for differences in meals. Thus, the actual difference between meat purchases in 1951 and 1952 was over $12,500 in favor of 1952, but after adjustment this difference was reduced to around $4,500.

The saving of $6,922.39 is sizable, but it is considerably less than the $14,000 saving predicted following the four-week study. It is evident that either the four weeks used as the basis for predicting savings were not typical of the years compared or else variables, acting in the dynamic operation of a large dietary department, were sufficient to wipe out a large part of the savings made.

CONCLUSIONS

One may conclude that under the conditions of this study, the use of prefabricated meats will not greatly reduce meat costs but the saving will still be significant judged by food cost control standards. However, other benefits, such as reduced labor costs, workloads, wastes and meat trimmings; improved portion, issue, and inventory control; improved mechanics of purchasing and precosting; plus other benefits, make continued purchase of prefabricated meats desirable for this specific hospital.

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Values of the School Lunch Program

Federal agencies concerned with school lunch programs have jointly prepared a statement of values inherent in the programs. Following are some of the points of emphasis:

(a) The noon meal served at school will fulfill its nutritional purpose only if it supplies at least one-third of the day's requirements for calories, protein, vitamins, and minerals.

(b) The public health agency can provide valuable assistance to school administrators in insuring that school lunchrooms meet accepted sanitary standards, both as to facilities and operations.

(c) The school lunch can provide a practical form of education in nutrition, sanitation, and social behavior for children, and can be a potent force in improving home food practices.

(d) To make the school lunch a school-wide educational project, it must be administered by school officials and operated with the assistance of qualified workers, whether paid or volunteer.

Copies of the complete statement are available from the Nutrition Programs Service, Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, Washington 25, D. C.

Dietary Surveys in Peru

I. San Nicolás, A Cotton Hacienda on the Pacific Coast[1]

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PRESENT-day concern with global nutrition has stimulated interest in dietary surveys. The Department of Nutrition of the Ministry of Public Health, Lima, Peru, has been conducting such surveys in Peru since August, 1951. A nutrition consultant of the Food and Agriculture Organization of the United Nations (FAO) organized the procedures, trained the personnel, and participated in the first surveys. With the cooperation and support of the Institute of Inter-American Affairs and the Department of Nutrition of the Harvard School of Public Health, the program has continued.

Geographically, Peru is divided into three distinct parts. Bordering the Pacific Ocean is the narrow coastal plain, a region with an average width of 30 mi. extending along the 1200-mi. coast line of the country, which comprises an estimated 10 per cent of the total country. Since there is practically no rainfall on the west side of the Andes Mountains, this narrow strip is a desert except in the river valleys. To the east of the low-lying desert the slopes of the Andes rise sharply, reaching altitudes of 10,000 to 20,000 ft. above sea level within a relatively few miles of the Pacific Coast. This mountainous area comprises almost 30 per cent of the total area of the country. Beyond the Andes and still farther to the east lie the great expanses of jungle, comprising about 60 per cent of the total area. The population of Peru is distributed in a ratio of 1:3:2 between coast, mountain, and jungle. These three areas are not only distinct geographically, but in large part, economically and socially as well.

To study the nutritional status of the peoples of Peru, representative sites from each of these areas were selected. In addition to food intake, data relating to the social and economic status of the populations were obtained. Physical examinations of children up to three years of age were made on all surveys, and in a few surveys, adolescents and pregnant and lactating women were also examined.

The most recent Peruvian census data were those of 1940 and were no longer applicable for sampling of population; thus, it was necessary to conduct a census prior to beginning the dietary survey. The census-taking provided an opportunity of acquainting the population with the purpose of the survey in addition to obtaining information on the socioeconomic structure of the population.

The "family" was chosen as the unit for study. The number of families selected generally represented 10 per cent of the total. Two or more dietary studies will be made at each survey site to investigate seasonal variations in food consumption. This is a report of a dietary survey conducted in September, 1951, in San Nicolás, a cotton hacienda on the coast

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of Peru. Child studies conducted simultaneously with the family studies will be reported later.

DESCRIPTION OF SAN NICOLÁS

San Nicolás is located on the coast of Peru in the Pativilca River Valley about 110 mi. north of Lima. The area generally is without rainfall, and the average yearly temperature is 18°C. San Nicolás covers an area of 1200 acres and has a population of 1542, 860 males and 682 females. It is typical of many agricultural haciendas[5] of the coast. Many of the families live and work on land owned by the proprietors of the hacienda, receiving their homes rent free and receiving pay for their work. The present chief crop of Hacienda San Nicolás is cotton, but some corn and vegetables are also grown.

The population was essentially young, with approximately 70 per cent less than thirty-five years of age. Twenty-five per cent of the school age or older population were unable to read, and only 24 people had completed what would correspond to a high school level of education. The chief occupation was agriculture with a small proportion engaged in trades or professions.

Of the 350 homes on the hacienda, 77 per cent were constructed of "adobe." Generally, the houses had one to three rooms; 90 per cent of the households obtained water for cooking and washing from public wells or fountains. Family sanitary facilities were rare. Kerosene lamps provided the principal source of light although a few homes had electricity.

The kitchen was often situated in a small room adjoining the main living room. In the homes of workers recently arrived from the Sierras, the cooking unit was at floor level and consisted only of stones. In the homes of families more native to the coast, better constructed, waist-level stoves were encountered. Dry corn cobs and cotton stalks furnished fuel for the kitchen, except occasionally where kerosene was used.

METHODS

After the census was taken, the families were divided into groups according to characteristics known to relate to economic status, such as number of family members gainfully employed and type of employment. From these groups, thirty-five families were chosen at random to obtain a representative sample stratified according to economic status. During the first interview the field workers explained that a small number of families had been selected *por suerte* (by luck) and each one, therefore, represented other families. The procedures and questionnaires were explained to them. None refused to participate and, in general, cooperation was excellent. The idea that fate had selected them may have influenced the willingness to participate.

[5] A hacienda is roughly comparable to a large plantation in the southern part of the United States.

Living conditions, literacy, and occupation of the families within the sample closely paralleled the pattern of the village as a whole. The size of the families varied from 1 to 12 members with 66 per cent having 4 to 7 members. The total number of people in the 35 families was 182, averaging approximately 5 members per family. Age, height, and weight of family members were recorded.

Each family was visited one or more times each day for seven consecutive days. During the daily interviews a complete list of all food purchased and consumed was obtained, and whenever possible the food was weighed. When food was not available for weighing, the price was noted, and the quantity then determined later by reference to a weight-price table, constructed as the survey continued. Each interviewer contributed data for this table daily. Field workers were on the alert for opportunities to obtain weights of food before and after preparation and to establish average values for weights of edible portions. Methods of food preparation were noted, and records were kept of the types of dishes served, together with their ingredients. Thus, information on meal patterns as well as a record of food intake and food costs was obtained.

The laboratory of the Department of Nutrition has for the past few years been analyzing Peruvian foods. The table of food composition developed was employed for the calculation of nutrient intakes (1). Since the laboratory did not determine the vitamin A content of foods, values for this nutrient in animal products were taken from the table published by the United States Department of Agriculture (2). Carotene content of vegetable foods was converted to vitamin A units, considering 1 mg. carotene equal to 1670 I.U. vitamin A. Fresh weights of edible portions of all foods were employed for calculations, and losses in preparation have not been considered. Nutrient intakes were then compared with those recommended by the Food and Agriculture Organization of the United Nations (3) and the Instituto de Nutrición de Centro América y Panamá (4), as described below.

All data were corrected where necessary for visitors and absentees employing the formula:

$$\frac{21 \times M}{(21 \times M) + V - A} \times 100 = \text{per cent correction}$$

where M, V, and A represent number of members in the family, the number of meals eaten by visitors, and the number of meals missed by member of the family, respectively (5). Corrections were made only in the cases of ten families of the thirty-five, when application of the formula indicated corrections of less than 95 or more than 105 per cent.

FOOD CONSUMPTION AND MEAL PATTERNS

In Table 1 are listed the important foods encountered in more than 25 per cent of the dietary

TABLE 1

Foods eaten by more than 25 per cent of the thirty-five San Nicolás families

FOOD	NUMBER OF FAMILIES LISTING ITEM	AVERAGE WEEKLY CONSUMPTION PER FAMILY*
		gm.
Fresh milk	14	3750
Butter	21	90
Eggs	18	115
Beef	9	900
Tripe (beef)	13	610
Mutton	30	1800
Liver	15	515
Pork	12	310
Fresh fish	15	640
Beans (*canario*)	27	1300
Rice	34	4100
Oats	25	290
Noodles, macaroni, etc.	35	1700
Crackers	10	90
Wheat flour	12	175
Corn (dry or ground)	14	280
Corn, fresh	27	400
Bread	35	4000
Wheat	9	800
Flour of *habas* (broad beans)	14	330
Sweet potato	27	4000
White potato	35	2800
Yuca (tuber)	29	1620
Squash	27	230
Carrots	28	150
Tomatoes	32	1100
Onions	34	400
Turnips	27	105
Cabbage	29	510
Janchoy (Chinese cabbage)	9	850
Caigua	28	220
Peas	11	155
Garlic	32	60
Oranges	14	1170
Bananas	20	1020
Olives	14	80
Sugar	35	3300
Fats and oils (lard, vegetable shortening, and oils)	34	670
Cocoa	21	125
Chocolate	10	200
Coffee	32	225
Salt	31	840
Tea	28	275

* Weight of edible portion. Average represents only the number of families listing each item.

records, together with the average amount consumed per week by those families in whose records the item appeared. Sixteen of the 35 families included milk (fresh, evaporated, condensed, or dried) in the menus for the week. The average amount for each of these families was approximately 500 gm. per day, or 100 gm. per day per person. Although eighteen families reported eggs, the average was only one to two eggs per week per family. The value for butter must be considered with some reservation. The people of villages such as San Nicolás often use the term *mantequilla* (butter) to include vegetable margarines as well as butter.

Mutton and various sheep cuts were the principal meats, although pork and beef were eaten in significant amounts. In addition to the meat items listed in Table 1, other products encountered were sheep's head, beef heart, organ meats, beef tongue, sheep's feet, ham, chicken, guinea pig, rabbit and *chicharrones*. The latter, a delicacy popular in Peru, is a product made by "hard-frying" small pieces of fatty pork. Considering the total of all meats consumed, regardless of kind or cut, an average value of 500 gm. per family per day was obtained. This meant an average value of 100 gm. per day per person, a consumption by no means low. Although the hacienda was on the coast, less than 50 per cent of the families ate any fresh fish, and this only in amounts equivalent to an average of approximately 90 gm. per day per family.

A fair variety of vegetables was noted, but the amounts consumed indicated that many were used chiefly as condiments or as minor constituents of the *guiso*, a combination dish or type of stew, often including meat, potatoes or rice, and vegetables. The *guiso* always has as its base the *ahogado*, made by frying together onions, garlic, *aji* (hot pepper), and tomatoes. To this is added the meat or vegetables, depending upon the type of *guiso*. Raw vegetables were consumed in insignificant amounts; even tomatoes were cooked as a component of the *guiso*.

Starchy foodstuffs, *yuca* (a tuber), *camote* (sweet potato), potatoes, and rice made up a major proportion of the diet; considered as a whole, they were consumed in amounts equivalent to 1.5 kg. per day per family. In addition, bread equivalent to 570 gm. per day per family and *fideos* (general name of noodles and similar products) equivalent to 240 gm. per day per family were eaten. Other cereals and cereal products made up a minor portion of the carbohydrate sources. The common bread of Peru is made of flour, water, salt, and yeast. Milk is almost never included in its formula. It is commonly sold in the form of rolls, loaf bread being much less popular. Brown bread is uncommon, and often is prepared by adding molasses to the dough, rather than by preparing it from whole wheat. White polished rice is the only rice generally available. Peru has as yet no program of enrichment of either flour or rice.

In addition to wheat flour, used only in small amounts since little or no home baking is done, flours prepared from *habas* (a type of broad bean), peas, and corn appeared in occasional dietary records. Perhaps somewhat surprising was the high sugar consumption, an average amount of 100 gm. per day per person. Since there was no baking and very little preparation of desserts, this sugar was used largely in beverages; the use of several teaspoons per cup of coffee or tea was not uncommon.

Lard or vegetable shortening was used in the preparation of the *guiso*, being employed in making the *ahogado*, and for browning the meat before adding it to this base. Rice also was often prepared with 1 or 2 Tbsp. fat or oil added prior to cooking.

Fresh fruits did not play an important part in the San Nicolás diets. In addition to the oranges and bananas listed in Table 1, the only other fresh fruits noted in the dietary records were apples (six families), *plátano de la Isla* (a type of banana with a very deep orange pulp) (two families), and limes (six families). The olives listed in the table were employed only as a garnish.

Considering the diets with respect to the basic food groups, cereals and carbohydrate-rich foods assumed a major role, with vegetables chiefly used as condiments or garnishes for the basic foods. Fresh fruits and fresh vegetables were eaten only in small amounts, as were milk and its products. Meats were consumed in fair amounts by almost all the families.

The families of San Nicolás observed the usual three-meal-a-day pattern, although thirteen of the thirty-five included a *lonche*, usually a small snack in the middle of the afternoon. Breakfast consisted of bread and a beverage, coffee being the most popular. Tea and a drink prepared from oatmeal also appeared in occasional records. In 12 per cent of the possible 245 breakfasts (7 days × 35), milk was used but usually only in coffee. No fruit appeared in the breakfast menu. The *lonche* was a duplication of breakfast.

The noon meal was the large meal of the day and typically consisted of soup, rice, beans, and a *guiso* made with meat and potatoes or *camotes*. The most common soup was made of water and noodles, flavored with a variety of condiments. The evening meal was similar but less substantial; soups were consumed in greater abundance, and there was less variety in the second course.

It should be pointed out that cooking practices were in general good. Water in which vegetables were cooked was never thrown out, and as a rule there was not much over-cooking of foods, probably because fuel was scarce and cooking units inconvenient.

Although the interviewers made efforts to obtain complete information regarding all food eaten during the days of the survey, the possibility exists that there was some consumption away from the house; it is unlikely, however, that such unrecorded data could affect the over-all picture to any significant extent.

INTAKES COMPARED WITH NUTRITIONAL STANDARDS

The average daily nutrient intakes of each family were calculated as described (see methods). The allowances for each family were obtained by totaling the allowances for individual members. Individual allowances were derived from the National Research Council Recommended Dietary Allowances (6), from tables prepared by the Instituto de Nutrición de Centro América y Panamá (INCAP) (4), and from the Food and Agriculture Organization caloric recommendations (3). Since it was impossible to conduct reliable activity studies, the caloric allowances for the "reference" man and woman were employed for adults. However, because of the hardships involved in day-by-day living, it may be that the average grade of physical activity for both men and women was higher than that of the reference man or woman. The INCAP tables allowed for a 5 per cent decrease in caloric allotment for each decade from thirty to fifty years instead of the 7.5 per cent FAO decrease. For the few adults whose weights were not obtained, the allowances for a 60-kg. man and a 55-kg. woman were used. The average weights of the adult men and women of the families included in the survey were 61 kg. and 54 kg. respectively.

One-half mg. thiamine and 5 mg. niacin were allowed for each 1000 calories. Adult allowances for the other nutrients were based on individual weights being proportional to the National Research Council recommendations (6). Nutrient allowances for children were those of the National Research Council, a correction being made in the calories because of the higher average temperature of the area.

TABLE 2

Comparison of nutrient intakes with recommended intakes

NUTRIENT	NUTRITIONAL RATING						RANGE OF VALUES
	Poor*		Fair†		Good‡		
	Number of families	Percentage	Number of families	Percentage	Number of families	Percentage	
							%
Calories	6	17	12	34	17	49	51–202
Protein	10	29	13	37	12	34	39–265
Calcium	33	94	2	6	0	0	12– 93
Iron	1	3	11	31	23	66	74–385
Vitamin A	16	46	1	3	18	51	14–550
Thiamine	16	46	12	34	7	20	46–176
Riboflavin	26	74	4	12	5	14	30–150
Niacin	5	14	3	9	27	77	38–328
Ascorbic acid	8	23	9	26	18	51	34–420

* Less than 75% of recommended intakes.
† 75 to 100% of recommended intakes.
‡ Over 100% of recommended intakes.

Intake was determined as the percentage of the recommended intake per family. A summary of these calculations is shown in Table 2. For each nutrient, the families have been classified into three groups; those with less than 75 per cent of the recommended intake, those between 75 and 100 per cent, and those greater than 100 per cent. The division with respect to percentage of recommended intake is arbitrary, but for purposes of general consideration might be considered as poor, fair, and good with respect to intake of each nutrient.

Although there was a wide variation in the individual values, it appeared that family size influenced dietary status. For the 19 families with 5 or less members, an average of 4.47 ± 2.35 of the nine nutrients were classified as "poor" or "fair," while for the 16 families with 6 or more members, an average of 6.06 ± 2.05 of the nine nutrients were in these groups. Application of Student's "t" test showed that the difference between the two groups of families was significant at the 5 per cent level. Thus, it appeared that the larger the family, the poorer the dietary status.

To study the relationships between the intakes of the various nutrients, the ten families with the lowest intake of calories, and the ten families with the best caloric intakes were selected (Table 3). Families fell into the "poor" and "fair" groups with respect to other nutrients when caloric intake was "low," and into the "good" group when caloric intake was also "good." However, the majority of the ten families with a good intake of calories fell into the "poor" calcium-intake group. Since thirty-two of the thirty-five families belonged to this group, the calcium intake was as expected (Table 2). The average intake for the entire sample was 33 per cent of the recommended amount. Only in the case of ascorbic acid did 50 per cent of the ten families with the lowest caloric intakes fall into the "good" group.

None of the thirty-five families was in either the "poor" or "good" groups with respect to all nine nutrients. Forty-three per cent had "poor" intakes of four or more nutrients, while 48 per cent had "good" intakes of four or more nutrients.

TABLE 3

Relationship of nutrient intakes to the caloric intake

NUTRIENT	NUMBER OF FAMILIES					
	Ten families with poorest caloric intake			Ten families with best caloric intake		
	Poor intake	Fair intake	Good intake	Poor intake	Fair intake	Good intake
Protein	10	0	0	0	1	9
Calcium	10	0	0	8	2	0
Iron	1	1	8	0	1	9
Vitamin A	7	2	1	3	0	7
Thiamine	9	0	1	1	4	5
Riboflavin	10	0	0	3	2	5
Niacin	3	4	3	0	0	10
Ascorbic acid	4	5	1	0	3	7

Complete family income data were difficult to obtain, and it was impossible to determine whether the stratification of families according to income was representative (see methods).

The low consumption of calcium, as well as that of riboflavin, can be partly accounted for by the low milk intake. The intake of thiamine was low, with 80 per cent of the families consuming less than 100 per cent of the recommended daily amounts. In general, caloric intake and protein, niacin, iron, and ascorbic acid intakes were good, with large numbers of the families consuming more than 100 per cent of the recommended daily allowances. The intake of vitamin A was the most variable, sixteen of the families being classified as "poor" and eighteen families as "good." The range, from 14 to 550 per cent of recommended amounts, illustrated this variation. The consumption of organ meats offered an explanation for this. Of the eighteen families with "good" vitamin A intakes, fifteen included liver or kidney in varying amounts in the week's diet. In contrast, thirteen of the sixteen families of the "poor" group included no organ meats. *Camotes* (sweet potatoes) and carrots were the chief sources of vitamin A precursors. There are two general kinds of sweet potatoes in Peru, although there are many species of both. The one eaten in greatest amounts is called *camote amarillo* or yellow sweet potato (Ipomoea Patatas), and its carotene content is approximately 0.8 mg. per 100 gm.[6]

In spite of the low consumption of fresh fruits and green vegetables, the ascorbic acid intake was in general good. Potatoes contributed amounts of this vitamin equivalent to 12 mg. per day per person. *Yuca*, with approximately 40 mg. ascorbic acid per 100 gm., contributed about 20 mg. per day per person. In general, the families "poor" in ascorbic acid intake consumed less than the average amount of potatoes and *yuca*, and in this group of eight families no ascorbic acid-rich fruits were included in the week's diet. As has been noted above, no allowance for cooking losses has been made.

There was no one predominant niacin-rich food which accounted for the good niacin intakes in these families. Foods, such as potatoes, *camotes*, rice, bread, and mutton, which were eaten in large quantities, contributed a high percentage of the niacin intake.

[6] Since this manuscript was prepared, additional samples of *camote* have been analyzed. The extreme range of carotene values observed has been from 0 to 1.24 mg. per 100 gm. A value of 0.77 mg. per 100 gm. was used in calculating the San Nicolás diets. If the average of all values obtained to date had been used (0.3 mg. per 100 gm.), the distribution of the 35 families with respect to vitamin A intake would have been 15, 2, and 18, in the "good," "fair," and "poor" groups respectively. These findings demonstrate an unavoidable weakness of dietary histories when foods which vary greatly in nutrient content are consumed.

The data showed that twenty-five of the thirty-five families consumed animal protein in amounts equal to or greater than 30 per cent of the total protein. For the entire sample of thirty-five families, animal protein represented on the average 35.6 ± 14.3 per cent of the total protein.

To determine the caloric distribution among fats, carbohydrates, and proteins, the total intakes for each family of these substances were multiplied by 9, 4, and 4, respectively. Total caloric intakes determined in this fashion were slightly higher than those determined from the sum of the calories contributed by each foodstuff, since the lower factors recommended by the Food and Agriculture Organization (7) were used in calculating the caloric content of the individual foods. Protein averaged 10.2 ± 1.6 per cent of the total calories, fats 18.6 ± 7.2 per cent, and carbohydrates 71.1 ± 4.8 per cent.

FOOD COSTS

Records showed that approximately 95 per cent of all food consumed during the week of the survey was purchased, the remainder being produced by or given to the families. Assuming normal market prices for all foodstuffs not purchased, the average daily food cost per family was found to be approximately 1 dollar (American). The data pertaining to family incomes were incomplete since cash income varied considerably from week to week, but data from twenty-five families showed an average daily income per family of about 70 cents (American). It was apparent that the money value of the food consumed during the week of the survey approximated or was greater than the cash income. The availability of money for fuel, clothing, and other necessities depended on the proportion of cash income spent for food.

PHYSICAL STATUS

The results of the physical examinations of children less than three years of age will be included in another report. However, it might be well to point out that such examinations revealed in several cases signs suggestive of vitamin A and riboflavin deficiencies. The examining physician felt that the weights and heights were slightly below the so-called "normal" values. However, normal values for this age group of the Peruvian population have not been well established. In spite of the low calcium intake, no clinical signs of rickets were observed.

DISCUSSION

The survey described represents one seven-day period. Since the coastal climate of Peru is moderate and not subject to wide seasonal changes, the food production and consumption does not vary greatly during the year. On the basis of the evidence from this study, it may not be amiss to consider possible directions for desirable changes in dietary habits.

As anticipated, the problems encountered require programs of education, food production, and over-all economic and social planning for their solution. Recommendations made directly to families for improvement in the diet must be those that can be incorporated without raising the total food costs, since family income closely approximated expenditures for food. A program of consumer education must be accompanied by an over-all effort to improve the standard of living.

Relatively simple and desirable changes which could be incorporated with the existing food patterns are the more liberal use of greens to increase the carotene, riboflavin, and calcium content of the diet; more frequent use of sweet potatoes, an excellent source of carotene; and the use of dried beans and peas in soup, in place of the noodles, to increase the B vitamins and protein.

These foods are available and at a low cost. However, greens and sweet potatoes have little prestige value, and measures must be found to enhance their popular appeal to increase consumption. In a dietary survey conducted in a mountain village (8), calcium allowances were met in some instances by generous amounts of *hojas de nabo silvestre* (a type of turnip green). These greens are also available in the coastal area and are important sources of carotene and ascorbic acid. A diet based on the average consumption of the frequently used foodstuffs (Table 1) supplemented with approximately 3 kg. "turnip greens" per week and with slightly increased amounts of fish and beans would meet the recommended dietary allowances for all nutrients for an average five-member family of San Nicolás.

Improving the calcium and riboflavin intake by increasing the consumption of dairy products is not practicable in Peru, due to high cost and relative scarcity of such products. Furthermore, the difficulties encountered in milk sanitation make its increased use questionable until sanitation problems can be solved.

The use of fresh raw greens cannot be recommended at this time until there is assurance that such products are free of disease-carrying organisms.

In increasing the use of any particular food, the effect of the changes on the over-all pattern of food must be scrutinized to avoid the inclusion of one food to the exclusion of other foods equally desirable. Present cooking practices, such as the use of cooking water and short cooking methods, should be commended and preserved. It would seem advisable to design a project to study methods for introducing the suggested improvements using a small group of families in a nutrition education program.

SUMMARY

A seven-day family dietary survey of thirty-five families (10 per cent of the total) living in Hacienda San Nicolás, Peru, was made in September 1951.

A census which preceded the dietary survey and in which information about socioeconomic status was obtained indicated a population with a relatively low standard of living. The dietary survey showed that 15 to 30 per cent of the thirty-five families consumed less than 75 per cent of the recommended intakes of calories, protein, niacin, and ascorbic acid. Half of the families were in the 75 per cent or less category for vitamin A and thiamine intake. Calcium and riboflavin were in the low category for three-fourths or more of the families.

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BIOGRAPHICAL NOTES FROM THE HISTORY OF NUTRITION

Stephen Hales—September 17, 1677–January 4, 1761

The growth of nutrition as a science was dependent on developments in physiology and chemistry. The first great step forward was William Harvey's discovery of the circulation of blood, published in 1628 soon to be supplemented by Malphigi's (1628–1694) description of the capillaries. The second great advance in physiology was Stephen Hales' measurements and description of blood pressure. With an understanding of the circulatory system, the foundation was laid for the understanding of how nutrients might be carried to all parts of the body.

Stephen Hales was minister of the village of Teddington, who served his parishioners kindly and serenely and devoted every spare minute to the study of science throughout his full and long life. A descendant of a baronet and sixth son of Thomas and Mary Hales, Stephen was born September 17, 1677. He entered Corpus Christi College of Cambridge University in 1696, obtaining his bachelor's degree in 1699 and his master's in 1703. He was a student of theology but received a broad general education and became interested in astronomy and the physical and chemical science of his day. He was ordained a deacon in 1703 and in 1708 became minister at Teddington, about 15 mi. from London. There he spent his life. Alone and unaided, he began the study of the circulation of blood in animals and, while at that time, there had been many calculations of blood pressure, no one had measured it. By measuring the height to which blood ascended in a brass tube inserted in the carotid artery, and then in the vein, of a horse, he showed the error of earlier calculations. Other studies included measurements of the heart capacity, the diameter of blood vessels, and factors causing the constriction of small blood vessels. His best known book, *Statical Essays*, was translated into Dutch, German, French, and Italian.

In later life, Hales became interested in the practical applications of science and experimented on the distillation of salt water and the preservation of water and meat on sea voyages, and invented artificial ventilators for ships which, though rejected by the Admiralty, were used on merchant vessels to America and were also installed in the Savoy and Newgate prisons. He also taught housewives to put an inverted teacup at the bottom of their pies to prevent the sirup from boiling over.

Hales became interested in mission work in America and, as a trustee of the newly founded colony of Georgia, was responsible for John and Charles Wesley going to Georgia.

Stephen Hales became renowned as a scientist and was elected to the Royal Society in 1718, received an honorary D.D. degree from Oxford in 1733, and was awarded the Copley Medal in 1739. He married in 1720, but his wife died the following year. Hales has been described as a man of sweet temper, happy disposition, and simplicity of manner. He died January 4, 1761 at the age of eighty-four.

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Reducing and Post-Reducing Maintenance on the Moderate-Fat Diet

Metabolic Studies[1]

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METABOLIC studies with obese college women ingesting a low-carbohydrate, moderate-fat diet have been reported previously from this laboratory (1, 2). These investigations were concerned with a three-week pre-reducing maintenance period followed by an eight-and-a-half-week period of a 1400-calorie diet and a two-week post-reducing maintenance period. As weight reduction progressed, the subjects showed a decrease in basal metabolic rate and a lowered retention of nitrogen, calcium, and phosphorus. Such decreases in metabolic activity and in retention of nutrients would have serious consequences if they continued for a long period following the loss of weight. Brown and co-workers (3, 4), Cederquist *et al.* (5), and Brewer *et al.* (6) have reported metabolic studies on obese subjects after a reducing period, but the subjects were few in number and the periods covered were of varying duration.

The present investigation was undertaken to study the nitrogen, calcium, phosphorus, and basal metabolisms of obese young women of college age during a post-reducing maintenance period of five and one-half weeks, to see if the poor retentions or deficits of the nutrients and the depression of the basal metabolic rate of the reducing phase continued.

METHODS

Six overweight women ranging in age from eighteen to thirty-one years were studied from the second week in February until the first week of June, 1952. They ranged from 11 to 48 per cent overweight, with an average excess weight of 25 per cent according to the Baldwin and Wood standards as given in MacLeod and Taylor (7). The women lived in their usual dormitory situations except that meals were eaten at the Special Diet Table operated by the School of Nutrition instead of in the dormitory dining halls.

Throughout the fifteen-and-a-half-week experimental period the subjects ate weighed diets with the exception of an occasional meal allowed away during non-balance periods. Careful record was kept of food intake at these meals taken away from the Table and was reported to the dietitian supervising the Table.

A 1400-calorie, high-protein (90 gm.), moderate-fat (80 gm.), and low-carbohydrate (80 gm.) diet, such as that used in the previous research (1, 2), was served to the subjects during the ten-week period of reduced caloric intake. A five-and-one-half-week period of maintenance during which the caloric level of the diet was increased for each subject until the subjects were no longer losing weight followed the reducing period. The calcium and phosphorus content of all diets was calculated to be approximately 1.0 gm. and 1.5 gm. per day respectively, while the level of each of the other nutrients was calculated to meet or exceed the National Research Council's Recommended Dietary Allowances for the sixteen- to twenty-year-old girl (8).

Nitrogen, calcium, and phosphorus retentions for each of the six subjects were determined at three intervals during the study: near the beginning of reduction (during the second or third week on the reducting diet); at the end of the reducing period (during the ninth or tenth week); and finally at the end of the post-reducing maintenance period (the fourth week post-reduction). Retentions were based on analyses of the seven-day samples of the intake and excreta. To avoid menstrual periods for all subjects, two successive balance periods were scheduled at the

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TABLE 1

Average daily values, calculated and analyzed, of reducing and post-reducing maintenance diets during balance periods

PERIOD	CALORIES (CALCULATED)	PROTEIN		FAT		CARBOHYDRATE (CALCULATED)	CALCIUM		PHOSPHORUS		IRON (CALCULATED)	VITAMIN A (CALCULATED)	THIAMINE (CALCULATED)	RIBOFLAVIN (CALCULATED)	NIACIN (CALCULATED)	ASCORBIC ACID (CALCULATED)
		Calculated	Analyzed	Calculated	Analyzed		Calculated	Analyzed	Calculated	Analyzed						
Reducing Diets																
		gm./day	*gm./day*	*gm./day*	*gm./day*	*gm./day*	*gm./day*	*gm./day*	*gm./day*	*gm./day*	*mg./day*	*I.U./day*	*mg./day*	*mg./day*	*mg./day*	*mg./day*
Second week*	1399	90.3	100.9	80.7	78.0	80.9	1.013	1.076	1.522	1.334	11.9	11,206	1.50	2.33	17.5	115
Third week*	1399	90.3	96.4	80.7	79.1	80.9	1.013	1.076	1.522	1.910	11.9	11,206	1.50	2.33	17.5	115
Ninth week†	1401	90.4	103.6	80.3	76.3	81.0	1.014	1.183	1.533	1.414	12.1	11,124	1.28	2.34	17.8	114
Tenth week†	1401	90.4	91.9	80.3	68.3	81.0	1.014	1.151	1.533	1.532	12.1	11,124	1.28	2.34	17.8	114
Post-Reducing Maintenance Diets																
Fourth week‡	1704	88.5	99.0	85.6	79.1	148.8	1.024	0.994	1.519	1.752	12.8	11,412	1.70	2.40	16.9	106
Fourth week‡	1797	89.5	100.2	89.6	82.6	163.3	1.031	1.007	1.549	1.780	13.2	11,756	1.72	2.40	17.3	110
Fourth week‡	1904	90.3	101.2	97.4	90.7	171.1	1.036	1.007	1.643	1.867	13.5	11,982	1.75	2.40	17.6	115
Fourth week‡	2006	90.8	101.6	104.7	96.7	178.3	1.039	1.011	1.652	1.907	13.6	12,092	1.80	2.40	17.7	115

* First balance period.

† Second balance period.

‡ Third balance period.

first two intervals described above. Each subject was then fitted into one or the other of these periods.

All food intake was sampled as the food was served. The seven-day composite was pooled, placed in shallow drying trays, frozen at low temperature overnight, then placed in the Desivac for drying, weighed, ground through a meat grinder, and sampled in duplicate for analysis for fat, nitrogen, calcium, and phosphorus. In addition, each student kept a measured record of all water intake, and the water supply was analyzed for calcium and phosphorus.

For each subject, completeness of the 24-hr. urine samples was checked by daily creatinine determinations (9); the samples were then pooled on a seven-day basis; at the end of the week, an aliquot was taken for analysis. Feces were marked by carmine, pooled for seven-day analysis, and treated in the same manner as the food samples. The methods of analysis used for nitrogen, calcium, phosphorus, and fat were the same as used previously (2).

Total blood lipids, phospholipids, and cholesterol were determined in the fasting blood samples withdrawn before weight reduction, at the end of weight reduction, and four weeks post-reduction. The methods of analysis were the same as those used previously (2).

At the time of each balance period, the basal metabolic rate of each subject was determined in duplicate. The subjects also kept a record of their physical activities on two weekdays and on one week-end day. Using these records, the average calories expended per day by each subject were calculated according to the procedure of Taylor and MacLeod (10). These figures served as a basis for predicting weight losses. These predictions, those arrived at by using the Mayo Clinic method (1), and the actual weight loss were compared.

RESULTS

Nutrient Intake

In Table 1 are given the calculated composition of the diet at different stages of the experiment and a comparison of the calculated and analyzed values for protein, fat, calcium, and phosphorus in the balance periods.

Weight Loss and Caloric Needs in Maintenance

The six subjects were initially 15 to 64 lb. overweight, with an average excess weight of 23 lb. In Table 2 are summarized the weight and personal data and the post-reducing maintenance needs for calories. In ten weeks, the subjects lost from 14 to 26 lb., or an average of 19 lb., with a median of 18.4 lb. Table 3 compares the actual weight loss with that predicted by the Mayo method and that based on activity records and basal metabolism tests. As in the previous report (1), in the majority of cases weight loss was more accurately predicted from the activity records and basal metabolism.

On the basis of daily weight records and weighed food intake for a five-and-one-half-week post-reducing maintenance period, the total caloric requirement was found to range from 1815 to 2130 calories per day when adjusted for any slight fluctuation in weight. The mean need was 1947 calories per day; the median, 1962.

Basal Metabolism

Basal metabolism tests taken after two or three weeks of reduction on the 1400-calorie diet showed

TABLE 2

Weight summary and post-reducing maintenance caloric needs for experimental subjects

SUBJECT	AGE	HEIGHT	INITIAL WEIGHT	EXCESS WEIGHT		FINAL WEIGHT AFTER REDUCTION	WEIGHT LOSS	RATE OF WEIGHT LOSS	WEIGHT AT END OF MAINTENANCE	ENERGY INTAKE DURING POST-REDUCTION MAINTENANCE (5½ WEEKS)	ENERGY NEED IN MAINTENANCE (ADJUSTED FOR GAIN OR LOSS IN 5½-WK. PERIOD)
	yr.	*in.*	*lb.*	*lb.*	%	*lb.*	*lb.*	*lb./wk.*	*lb.*	*calories/day*	*calories/day*
1	19	65.5	144¾	14¾	11.3	130¾	14	1.4	129½	2017	2130
2	19	67.75	158	20	15	141¾	16¼	1.6	141½	1800	1822
3	31	66.5	175¾	33¾	24	150	25¾	2.6	149	1900	1991
4	23	66.0	197	64	48	174¼	22¾	2.3	174	1927	1949
5	20	67.5	182	44	32	161½	20½	2.0	163	2112	1976
6	18	67.1	163	27	20	148½	14½	1.4	149½	1906	1815
Mean.....	21.7			23.3	25		19.0	1.9		1944	1947
Median....	19.5			30.2	26		18.4	1.8		1916	1962

TABLE 3

Comparison of predicted and actual weight loss

SUBJECT	WEIGHT LOSS		
	Predicted by Mayo Method	Predicted on basis of activity and basal metabolism	Actual
	lb./week	*lb./week*	*lb./week*
1	1.3	1.7	1.4
2	0.9	1.5	1.6
3	1.1	1.8	2.6
4	1.7	2.5	2.6
5	1.3	2.2	2.0
6	1.2	1.8	1.4

TABLE 4

Basal metabolism in reducing and post-reducing periods

SUBJECT	WEIGHT LOSS	EXCESS WEIGHT BEFORE REDUCTION	EXCESS WEIGHT LOST	DAILY BASAL CALORIES			CHANGES IN BASAL METABOLISM FROM FIRST BALANCE TO POST-REDUCING TEST
				Reducing period		Post-reducing maintenance (3½–4½ weeks)	
				2–3 weeks	9–10 weeks		
	lb.	%	%				%
1	14	11.3	95.5	1421	1303	1310	−7.8
2	16¼	14.5	81.4	1297	1195	1154	−11.0
3	25¾	23.8	76.5	1320	1233	1289	−2.3
4	22¾	48.1	35.6	1585	1390	1445	−8.8
5	20½	31.9	46.7	1404	1334	1216	−13.4
6	14½	20.0	50.0	1352	1258	1324	−5.3
Average..				1397	1286	1289	−8.1

all subjects to be within at least the low normal range in relation to the Mayo Foundation standards (11) on the basis of their ideal weights (Table 4). At the end of nine to ten weeks of reduction, the basal metabolism of nearly every subject had fallen approximately 100 calories per 24 hr. The basal metabolism at the fourth week of post-reducing maintenance had decreased still further for two subjects; remained essentially the same for one; and increased somewhat for three. However, in all cases, the basal metabolism was somewhat lower post-reduction than early in reduction. Unfortunately, in this experiment we do not have pre-reducing values. The average change between the fourth-week post-reducing tests and the tests taken after two to three weeks of reduction was a decrease of 8.1 per cent or approximately 113 calories per day.

Balance Studies

As in the previous report (2), the authors followed the practice of Leverton and Gram (12), disregarding retentions or losses of nitrogen which were less than 5 per cent of the intake or of calcium and phosphorus which were less than 10 per cent of the intake. This was done because of the difficulties in being sure that the fecal composite represented accurately the intake supposedly marked by carmine.

In Table 5 are presented the results of the nitrogen, calcium, and phosphorus balance studies conducted near the beginning and at the end of weight reduction and at the end of the four weeks of post-reducing maintenance. In the present study, there is no pre-reducing period to give baseline values for comparison. The first reducing period occurred slightly earlier than the one reported in the previous study (2). The final reducing period was just slightly later in the course of study than that reported in 1952. However, results for the balance studies of the present six subjects during reduction were very comparable to those reported on ten subjects in 1952.

Nitrogen. With an intake of 15.42 to 16.14 gm. nitrogen per day, after two or three weeks of reduction, half of the subjects were still retaining nitrogen and the remaining 50 per cent were essentially in balance. By the ninth to tenth week of reduction with an intake of 14.71 to 16.57 gm. nitrogen per day, all but one subject were in definitely negative nitrogen balance. One subject (No. 3) was retaining nitrogen. These findings are in close agreement with those reported previously (2). After four weeks on

TABLE 5

Mean daily retentions of nitrogen, calcium, and phosphorus

PERIOD	RETENTION						INTAKE	SUMMARY		
	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5	Subject 6		Retention*	Balance†	Loss‡
Nitrogen										
	gm./day	*gm./day*	*gm./day*	*gm./day*	*gm./day*	*gm./day*	*gm./day*	*number of subjects*	*number of subjects*	*number of subjects*
Reducing										
Second to third week	2.678R*	1.037R	−0.723B	0.734B	1.581R	0.147B	15.42–16.14	3	3	0
Ninth to tenth week	−2.174L‡	−1.101L	2.877R	−2.981L	−2.885L	−1.957L	14.71–16.57	1	0	5
Maintenance (fourth week)	0.529B†	1.535R	−0.447B	−0.002B	0.171B	1.333R	15.85–16.25	2	4	0
Calcium										
Reducing										
Second to third week	0.477R	0.550R	0.246R	0.086B	−0.029B	0.553R	0.879–1.076	4	2	0
Ninth to tenth week	−0.270L	0.154R	−0.221L	−1.016L	−0.169L	0.010B	1.151–1.183	1	1	4
Maintenance (fourth week)	0.039B	0.251R	−0.376L	0.157R	0.119R	0.044B	0.994–1.011	3	2	1
Phosphorus										
Reducing										
Second to third week	1.041R	0.601R	−1.390L	1.026R	1.050R	0.903R	1.334–1.914	5	0	1
Ninth to tenth week	−0.310L	−0.866L	−4.674L	−1.087L	−1.347L	−1.104L	1.414–1.533	0	0	6
Maintenance (fourth week)	0.133B	−0.143B	−0.893L	−0.027B	0.136B	0.199R	1.753–1.907	1	4	1

* Retention greater than 5% of intake for nitrogen or 10% of intake for calcium and phosphorus.

† Balance: retention or loss less than 5% of intake for nitrogen or 10% of intake for calcium and phosphorus.

‡ Loss greater than 5% of intake for nitrogen or 10% of intake for calcium and phosphorus.

a post-reducing maintenance regimen, with essentially the same nitrogen intake (15.85 to 16.25 gm. per day), all subjects were back in nitrogen balance; in fact, two of the six (No. 2 and 6) were definitely retaining nitrogen.

Calcium. After two to three weeks on the reducing diet with an intake of 0.879 to 1.076 gm. calcium daily, all six subjects were either retaining calcium (No. 1, 2, 3, and 6) or in calcium balance (No. 4 and 5). By the ninth to tenth week with an intake of 1.151 to 1.183 gm. calcium per day, four of the six subjects were in definite calcium deficit, one (No. 2) was still retaining calcium, and one (No. 6) was essentially in balance. However, after only four weeks of the post-reducing maintenance regimen, only one (No. 3) was still in calcium deficit. Three of the subjects were definitely retaining calcium (No. 2, 4, and 5), and two subjects (No. 1 and 6) were essentially in calcium balance.

Phosphorus. The phosphorus picture is much the same as that for calcium. After two to three weeks on weight reduction with an intake of 1.334 to 1.914 gm. phosphorus daily, five subjects were retaining phosphorus and one subject (No. 3) was losing considerable phosphorus. By the ninth to tenth week (intake 1.414 to 1.533 gm. phosphorus per day), all six subjects were definitely in negative phosphorus balance. However, by four weeks post-reduction, the majority were essentially in phosphorus balance. One subject (No. 6) was retaining phosphorus, and one (No. 3) was still losing phosphorus, but at a less rapid rate than previously.

Total Lipids, Phospholipids, and Cholesterol

The fasting total lipid, phospholipid, and cholesterol values for all subjects before the start of weight reduction were within normal limits with the possible exception of Subject No. 3 whose total cholesterol value was somewhat high (Table 6). By the end of the reducing period, the total lipid, phospholipid, and total cholesterol values of two subjects exceeded the usual normal limits. These values rose to still higher levels by the end of the fourth post-reducing maintenance week. These two subjects (No. 2 and 3) are also the two subjects with the lowest basal metabolic rates initially. As a general trend, the total lipid, phospholipid, and total cholesterol values for fasting blood of practically all subjects increased somewhat with weight reduction.

DISCUSSION

Caloric Requirement for Weight Maintenance. The approximately 2000 calories required for post-reducing maintenance over a five-week period compares favorably with other values reported in the literature. Our findings (1) reported in 1952, of 1600 to 2260 calories with an average of 1806 calories per day,

TABLE 6

Blood lipid, phospholipid, and cholesterol values

PERIOD	TOTAL LIPIDS	PHOSPHO-LIPIDS	TOTAL CHOLES-TEROL	FREE CHOLESTEROL	
	Subject 1				
	mg./100 ml.	*mg./100 ml.*	*mg./100 ml.*	*mg./100 ml.*	*%*
Before reducing	470	205	152	40	26.5
End of reducing	615	230	213	61.5	29
Fourth week of post-reducing maintenance	540	210	180	53	29.5
	Subject 2				
Before reducing	580	220	186	51	27.5
End of reducing	815	325	297	82	28
Fourth week of post-reducing maintenance	970	375	317	86	27
	Subject 3				
Before reducing	695	240	240	65	27
End of reducing	871	275	315	91	29
Fourth week of post-reducing maintenance	1000	345	380	107	28
	Subject 4				
Before reducing	640	205	201	54.5	27
End of reducing	690	225	234	68	29
Fourth week of post-reducing maintenance	705	285	235	64	27
	Subject 5				
Before reducing	545	220	180	50	28
End of reducing	586	215	165	47	28.5
Fourth week of post-reducing maintenance	600	265	210	56	26.5
	Subject 6				
Before reducing	680	255	229	60	26
End of reducing	700	270	246	66	27
Fourth week of post-reducing maintenance	595	250	230	61	26.5

were based on an admittedly too short two-week post-reducing period. In earlier work on subjects eighteen to twenty years of age who were followed for two to seven weeks on a maintenance diet after reduction, Brown *et al.* (3, 4) reported that two of five subjects showed no weight change on 1570 calories. For the three other subjects, if adjustment were made for weight loss in the maintenance period, daily caloric needs were 1770, 1870, and 2570 respectively. Their subjects then averaged a caloric need of 1870 calories per day for maintenance. Cederquist and co-workers (5) found that their two subjects of unstated age who were followed for thirteen weeks post-reduction on a maintenance diet required approximately 1900 and 2000 calories per day respectively.

The weight maintenance requirements of 1900 to 2000 calories per day are considerably less than the 2400 calories suggested by the Recommended Dietary Allowances for girls sixteen to twenty years of age, but are approximately the caloric allowance suggested for the sedentary adult woman. Since it is difficult to imagine many sedentary adult women who are as active as the college women we have had under study, these findings cause one to view with conservatism the caloric allowances for women.

Basal Metabolism. The basal metabolic decreases found as weight reduction progresses are similar to those previously reported (1, 3). Furthermore, the slight but definite depression in metabolism is not alleviated by a maintenance diet, at least within the time interval of this study (approximately one month). Our findings have the same trend but are of lesser magnitude than those found in another investigation of post-reducing metabolism. Brown and Ohlson (3) found that their subjects' basal metabolism tests taken seventy-one days after the beginning of reduction showed an average decrease of 17 per cent from the pre-reducing values. Their maintenance tests taken twenty-four days post-reduction were still an average of 14 per cent below the pre-reducing values. Unfortunately, Cederquist *et al.* (5) do not report basal metabolism for their two subjects in the post-reducing period.

Nitrogen Balance. The nitrogen balance findings during weight reduction reported here were very similar to those reported previously by the senior author (2). In the majority of cases, nitrogen deficit occurred by eight to ten weeks on the reducing diet; however, the nitrogen balance was restored by the fourth week of weight maintenance. Brown *et al.* (4) reported that on a post-reducing maintenance diet, the average nitrogen retention of their five subjects was 0.04 gm. per day with an average intake of 15.93 gm., a somewhat higher level than used for their reducing diets. Two of the five subjects were losing approximately 1 gm. nitrogen per day. However, it is unfortunate that for the balance studies reported by them it was necessary for the sampling to be done three to twenty-two days after the beginning of the post-reducing period. Brewer *et al.* (6) report somewhat higher nitrogen retention values in post-reduction for their four subjects. All of the subjects studied by Brewer and co-workers were in nitrogen equilibrium or retaining nitrogen during the post-reducing maintenance period.

From our findings, then, nitrogen deficit in weight reduction would appear to be the result of caloric

stress and to be relieved fairly promptly with the alleviation of caloric stress (at the protein levels used in this experiment).

Calcium Balance. There is more conflict between the calcium findings given here and those reported in the literature. The negative calcium balances found in the later stages of reduction were similar to those reported previously (2). From the calcium balance studies of the post-reducing period, it would appear that the subjects returned to calcium retention or calcium balance when the stress of weight loss was relieved. If this is true, except for very prolonged weight reduction, one would have less concern with the calcium losses during the process. For their five subjects, Brown *et al.* (4), with samplings three to twenty-two days post-reduction, reported an average calcium deficit of 0.029 gm. on an average daily intake of 1.217 gm. However, only one of the subjects was in deficit (loss greater than 10 per cent of intake); the other four were essentially in balance. Findings by Brewer *et al.* (6) for two subjects studied at intervals over a thirteen-week post-reducing period are difficult to compare with those in this and in the study of Brown *et al.*, since values are given only as mean retention for the two subjects. The average retention varied from −0.05 to −0.20 gm. per day on a mean calcium intake varying from 0.85 to 1.16 gm. per day. Brewer and co-workers felt that the delay in adjustment to the slightly increased intake of calcium in the post-reducing period apparently reflected possible strain imposed on calcium metabolism during weight reduction. Unfortunately, from her paper it is impossible to determine the calcium status during weight reduction of the two subjects who were followed for the post-reducing period of thirteen weeks.

Phosphorus Balance. The phosphorus balance studies showed much the same trend in this experiment as did those for calcium, and the results in the reducing phase of the experiment were similar to our previous findings (2). The five subjects of Brown *et al.* (4) showed an average deficit of −0.082 gm. phosphorus on an average intake of 1.628 gm. per day. Three of the subjects were essentially in balance and two, in definitely negative balance at the three to twenty-two-day post-reducing sampling period. Brewer *et al.* (6) did not report phosphorus balances.

Our findings of negative balances for nitrogen, calcium, and phosphorus as weight reduction progresses which appear to be reversed by the fourth week of post-reducing maintenance lead to an interesting speculation for further research. It occurs to the senior author to wonder if there might not be advantages to developing what might be known as a step-wise reducing regimen. In such a regimen an individual might be placed on a good reducing diet for say, four weeks, then shifted to maintenance for four weeks, then back to reducing, and so on, until the weight is taken down by steps to the desired level. There might be both psychologic and physiologic advantages to such a regimen. In terms of her clinical experience she has found that there is one group of patients from whom one can expect good cooperation in adhering to a diet for a period of three to six weeks. Then, these patients often fall by the wayside; they find continued adherence to the diet monotonous and continued self-restraint difficult. Many times, if one could hold these patients, perhaps by means of an interim maintenance period, they will go back to the diet and continue to lose weight. Hence, there might be a psychologic advantage in a planned step-wise reduction.

The findings from this study may also indicate a possibility of a definite physiologic advantage to such a procedure. By about four weeks, subjects in general are still in calcium and nitrogen balance. Shortly after this, many apparently go into negative balance, possibly as the result of stress. In the cases studied here, in the majority of instances nitrogen and calcium balance is restored by the end of three or four weeks of maintenance. Perhaps by step-wise reduction, it might be possible to minimize stress and hence possibly to avoid nitrogen and calcium deficits, giving the body an opportunity to make adjustments to weight loss as it goes along. Since the ultimate objective of weight loss is a maintained weight loss, this regimen might be more successful in achieving the final objective. In any case it makes interesting "armchair" research which we propose to investigate in future work.

Also, there is no evidence as to whether the calcium deficits so often reported in weight reduction with women also occur in men or whether they may be sex specific. This point deserves further investigation. Too, it would be of interest to know how long calcium deficits continue in the weight reducing process. What happens in our clinic patients who lose 50 or 60 lb. or more over a period of six months to a year? From the findings reported in the present study, it would seem that one need not be concerned about calcium deficits found in relatively short reducing periods, since the body apparently returns to calcium retention fairly promptly once weight maintenance is established. However, we have little or no information as to what takes place in extended reducing periods. In the sixteen-week study by Brewer *et al.* (6), three of the six subjects on a low-carbohydrate diet had "increased negative retentions" during the last six weeks of weight reduction.

SUMMARY

Six college women, 15 to 64 lb. overweight, were studied for ten weeks on a 1400-calorie reducing diet in which 50 per cent of the calories were furnished by fat, followed by a five-and-one-half-week post-reducing and weight maintenance period on a diet of essentially the same nitrogen, calcium, and phosphorus content.

Nitrogen, calcium, and phosphorus balance studies were made at the second or third week and at the ninth or tenth week of reduction and again at the fourth week of the post-reducing maintenance period. Basal metabolism was also studied at the same intervals. Fasting blood total lipids, phospholipids, total and free cholesterol values were obtained before and at the end of weight reduction and after four weeks on weight maintenance.

The subjects lost an average of 19.0 lb. in ten weeks.

The average drop in basal metabolism of 8 per cent observed from the second or third week to the ninth or tenth week of weight loss was maintained after four weeks on a post-reducing maintenance diet.

The nitrogen, calcium, and phosphorus deficits which occurred in the majority of subjects by the ninth to tenth week of weight reduction were reversed on most cases by the fourth post-reducing week. All subjects were either in retention or balance for nitrogen, and only one subject in six remained in calcium or phosphorus deficit.

In the five-and-one-half week post-reducing maintenance period, the total daily caloric requirement was found to range from 1815 to 2130 calories with a mean requirement of 1947 calories.

As a general trend, the total lipid, phospholipid, and total cholesterol values for fasting blood of practically all subjects increased somewhat with weight reduction. In the majority of cases these values increased to a limited degree in the post-reducing maintenance period.

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New Method for Measuring Nonfat Solids in Liquid Milk

A newly developed instrument for measuring nonfat milk solids may revolutionize the method of pricing milk to farmers. With the growing market for nonfat milk solids, dairymen have questioned the pricing of milk on butterfat content alone. However, lacking a practical and dependable method of determining other qualities of milk, the practice has continued.

Lactometers, which measure milk's specific gravity, have been used for years to gauge solids content, but the results have been unreliable. One difficulty has been that tests are made at 60°F., at which temperature the partial solidification of milk fat makes readings unreliable. Also, lactometers have not been accurately calibrated and were too fragile for use in dairy plants, being made of glass. The only dependable method has been the oven-drying method, a slow laboratory process.

Now, Paul D. Watson, dairy chemist of the Agricultural Research Administration, has developed a lactometer made of sturdy aluminum. Using it, milk is heated to 102°F. (just above bovine body heat) and readings are taken at that temperature. With a new formula and an accurately calibrated instrument, readings on milk average within 0.1 per cent of the oven-drying method, and the test is equally reliable for whole or skim milk.

Preliminary trials, using the new lactometer and a new formula—plus the regular butterfat test—indicate this method will be practical for use in dairy plants. Experiments to ready the lactometer and formula for widespread use are continuing in the Bureau of Dairy Industry in cooperation with the American Dairy Association and the University of Maryland. —*From: Agricultural Research 2: 15 (July), 1953.*

Supranormal Dietary Requirements of Acutely Ill Patients[1]

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IT IS well recognized that ill patients have different and, as a rule, higher nutritional requirements than well individuals at rest. The accumulation of detailed information on what the requirements actually are in various disease states has been slow, and the quantitative information in some fields is still quite meager. After reviewing the data on the extent of these requirements, some earlier data on what may happen if dietary requirements are not met, especially if the patient goes into negative nitrogen balance for a long enough period to produce hypoproteinemia, will be presented. Fina ly, some of the problems on the ways of meeting the supranormal requirements under some of the difficult conditions in which they develop will be considered.

Weight loss in association with disease has, of course, been known from prehistoric times. Generally, however, there has been a decrease in intake during periods of illness so that it has not been possible to attribute the weight loss to an increased requirement for food. For many decades now, it has been known that fever was associated with an increase in basal metabolism of about 8 per cent per degree Fahrenheit. Since the fundamental techniques for basal metabolism were worked out, it has been well known that hyperthyroid patients have a markedly increased requirement for food.

About fifteen years ago, Whipple and his associates (1) noted that following liver injury a pronounced drop in serum protein occurred. They also noted that when infection occurred in a normal animal, there was an abrupt increase in nitrogen loss. Furthermore, they could produce this reaction simply by the subcutaneous injection of 1 c.c. turpentine, with the resultant production of a sterile abscess.

These earlier studies were carried out in the dog, but in 1936 clinical studies appeared in the literature by Cuthbertson and his associates (2), who carried out nitrogen balance studies on patients with long bone fractures. Their results have been confirmed and extended in a number of other laboratories. Briefly it may be stated that a patient sustaining a fracture of the femur goes into negative nitrogen balance, even though he consumes an average intake of protein, calories, and vitamins, and that this negative nitrogen balance usually lasts at least ten days. Furthermore, if an effort is made to overcome the negative nitrogen balance by increasing his nitrogen intake, the patient will not, in general, go into positive balance but will excrete more nitrogen. With extremely high intakes, Werner (3) has been able to keep such a patient in positive nitrogen balance, but most patients with fractures undoubtedly do develop negative nitrogen balance in clinical practice. The amount of the negative nitrogen loss has been calculated to exceed local tissue destruction and is, therefore, believed to reflect a more widespread loss of the body's nitrogen stores.

NITROGEN LOSS IN SURGICAL PATIENTS

Table 1 shows representative losses of nitrogen which occur in patients seen in surgical wards before operation. As you see, these are largely the dramatic losses of nitrogen, occasioned by illness or injury. They do not include the very extensive losses which develop partly as the result of poor intake in chronically ill patients.

Table 2 shows additional nitrogen losses occurring during surgery. One seldom thinks of blood and plasma losses in terms of the negative nitrogen balance which they represent. One gets some indication of the importance of these losses when one measures the blood urea nitrogen or nonprotein nitrogen in patients after bleeding peptic ulcers and finds the very marked rise which often occurs. Experimental studies indicate that this rise is a direct result of the rapid digestion and absorption of blood from the intestinal tract, and that it can be reproduced quanti-

[1] Presented at the 35th Annual Meeting of The American Dietetic Association in Minneapolis, on October 21, 1952.

TABLE 1

Nitrogen losses in various types of surgical patients before operation

ILLNESS	NITROGEN LOSS	TIME
	gm.	*days*
Bleeding peptic ulcer—Bockus (4)	90.72	5
Thermal burn—Hirshfeld *et al.* (5)		
Surface oozing	7.84	1
Total nitrogen loss	30.88	1
Small bowel obstruction—Fine and Gendel (6)	11.04	1
Long bone fractures—Cuthbertson (2)	137.00	10
Long bone fractures—Howard *et al.* (7)	190.00	variable number of weeks

TABLE 2

Nitrogen losses (due to blood loss) in various types of surgical patients during operation (based on 3 gm. nitrogen per 100 c.c. blood)

OPERATION	NUMBER OF PATIENTS	NITROGEN LOSS		
		Minimum	Average	Maximum
		gm.	*gm.*	*gm.*
Radical mastectomy—Coller *et al.* (8)	4	15	24	31.5
Thyroidectomy — Coller *et al.* (8)	8	3	12	21.0
Abdomino-perineal resection—Coller *et al.* (8)	12	6	12	21.0
Gastric operations (complicated)—Coller *et al.* (8)	3	9	18	24.0
Operations involving large body surfaces—Coller *et al.* (8)	3	13.5	36	42.0
Pneumonectomy—Miller, Gibbon, and Allbritten (9)	16	21	57	108.0
First stage thoracoplasty—Miller, Gibbon, and Allbritten (9)	10	12	22.5	60

tatively by the introduction of stored human blood into the intestinal tract through a tube.

It is known from the experiments of Whipple (1) and others that a protein-depleted state retards or prevents regeneration of hemoglobin and/or plasma protein. It is evident, therefore, that the loss of blood occurring during surgery may be a significant nutritional handicap, especially when it is superimposed on preoperative losses. For purposes of rough estimate, 100 c.c. blood may be considered to contain 3 gm. nitrogen. On this basis, the losses shown in Table 2 occurred during various operations in which blood loss was measured.

If the patient has not previously lost what Whipple called the "labile protein store," he is likely to do so after an operation. As we now know, this catabolic response is set off, at least partly, by the adrenopituitary axis. The mechanism is believed to operate somewhat as follows: The injury excites the medulla of the adrenal through the sympathetic nervous system, and this portion of the gland produces adrenalin which enters the circulation. The adrenalin has many effects, one of which is to stimulate the pituitary to produce adrenocorticotropic hormone, or ACTH. This in turn enters the blood and circulates back to the adrenal where it stimulates the adrenal cortex to produce its specific hormones, including cortisone. Associated with this type of response, there is usually a breakdown of nitrogen, most of which is excreted in the urine as urea. This may result in an increase of 50 per cent or more in the nitrogen losses of the body. Table 3 shows cumulative negative nitrogen balances due to the catabolic response incident to various types of trauma.

TABLE 3

Nitrogen losses in various types of surgical patients after operation

OPERATION	NITROGEN LOSS	TIME
	gm.	*days*
Herniotomy—Brunschwig *et al.* (10)	18.0	10
Subtrochanteric osteotomy—Howard *et al.* (7)	65.0*	14
Gastric resection—Riegel *et al.* (11)	54.0	5
Cholecystectomy—Brunschwig *et al.* (10)	114.0	10
Gastric resection—Brunschwig *et al.* (10)	175.0	10
Acute appendicitis (peritonitis)—Brunschwig *et al.* (10)	49.0	10
Repair, perforated peptic ulcer—Brunschwig *et al.* (10)	136.0	10
Radical mastectomy—Brunschwig *et al.* (10)	15.0	10

* Average of 3 patients.

Several authors have endeavored to keep postoperative patients in nitrogen equilibrium, with varying degrees of success. Some estimates of the food requirements of adult patients undergoing such procedures are presented in Table 4. It must be admitted that such estimates are rough and that there is much individual variation. Whereas, one patient may appear to come into nitrogen equilibrium fairly easily, another may remain in negative nitrogen balance even when quite large increases in nitrogen intake are provided.

To relate grams of nitrogen per kilogram body weight to food intake, the following example might serve as a guide to explain how much is represented in the way of food. For an 80-kg. individual, an intake of 0.3 gm. nitrogen per kilogram body weight per day means 24 gm. nitrogen, or 150 gm. protein.

To summarize these data, one might say that for a mild operation perhaps a 30 to 60 per cent increase

in protein requirement and a 25 to 30 per cent increase in caloric requirement is in order. For extensive operations, such as gastric resection, the increases should be of amost twice this magnitude. For the most drastic procedures and injuries, such as severe thermal burns, still larger intakes may be required if nitrogen equilibrium is to be reached. Thus, Levenson and his co-workers (15) found in one of the survivors of the Cocoanut Grove fire that an intake of 300 gm. protein was necessary to produce nitrogen equilibrium. An intake of this extent is obviously difficult to achieve.

RESULTS OF NEGATIVE NITROGEN BALANCE

Let us now look at the results of neglecting these supranormal requirements. Suppose our patient does go into negative nitrogen balance, does any real harm result? Undoubtedly, the answer depends on how far into negative nitrogen balance he goes during his hospital experience and also on his nutritional history for some weeks or months back. We have no very good methods for estimating an individual's labile protein store. Possibly the best method of seeking evidence on the individual's nutritional history, when he is unable to give a reliable account, is the measurement of the total circulating serum protein or, perhaps better still, of the total circulating serum albumin. This is a fairly sensitive indicator. It requires not only measurement of the serum protein concentration and A/G ratio, but also measurement of the plasma volume, utilizing one of the dilution techniques. When the protein is found to be low in concentration, it almost invariably means that the plasma volume is also diminished (16). Demonstration of a frank hypoproteinemia with a marked reduction of plasma protein concentration, therefore, usually reflects, first, a negative nitrogen balance of fairly long standing and, second, a decrease in the circulating plasma volume.

It is difficult to show that a patient is better for receiving a high food intake than he is if he receives a normal food intake. It is, however, easy to show that an individual suffering from a severe nutritional deficiency is much worse than a patient who has enough food. There are six demonstrated dangers of hypoproteinemia:

(a) Wound rupture due to poor fibroplasia
(b) Vomiting after gastroenterostomy
(c) Delayed gastrointestinal motility
(d) Delayed callus formation as shown by x-ray in experimental fracture
(e) Increased predisposition to hemorrhagic shock
(f) Decreased resistance to infection

There are a number of other dangers of hypoproteinemia, perhaps less clearly demonstrated, but nevertheless of considerable significance. There are data in support of each of these six points. Studies have shown that the tendency of wounds to disrupt in hypoproteinemic animals is due to a delay in fibroplasia. Figures 1 and 2 show the delay in gastric emptying in a case of hypoproteinemia. The effect

TABLE 4

Estimated nitrogen requirements for equilibrium in early postoperative period

OPERATION	NITROGEN	ENERGY
	gm./kg./day	*calories/kg./day*
Gastrectomy—Riegel *et al.* (11)	0.30	30
Craniotomy—Drew *et al.* (12)	0.25	25
Gastrectomy—Werner (3)	0.40	16
Gastrectomy—Mulholland *et al.* (13)	0.39	57*
Herniorrhaphy—Werner (3)	0.21	not stated
Cholecystectomy—Werner *et al.* (14)†	0.20	35

* Strongly positive balance.

† Calculated from chart on assumption that patient weighed 70 kg.

TABLE 5

Effect of hypoproteinemia on susceptibility to hemorrhagic shock as reported by Ravdin et al. (18)

DOG NUMBER	SERUM PROTEIN	EXTENT OF HEMORRHAGE REQUIRED TO PRODUCE SHOCK
Normal Dogs		
	gm./100 ml.	*c.c./kg.*
127	6.1	51.9
473	5.3	48.1
493	6.2	37.9
686	5.5	48.1
729	5.9	48.0
Average	5.8	46.8
Hypoproteinemic Dogs		
102	4.1	25.6
41	3.0	25.2
182	3.7	28.7
207	3.5	25.9
797	3.8	27.7
796	2.9	32.8
Average	3.5	28.0

TABLE 6

Effect of improper nutrition on resistance to infection as presented by Robertson and Tisdall (19)

DEFICIENCY	NUMBER OF ANIMALS	SURVIVORS ON DEFICIENT DIET	SURVIVORS ON ADEQUATE DIET
		%	%
Vitamin A	24	40	79
Vitamin B	151	20	72
Vitamin D	739	28	55
Minerals	124	54	87
Animal protein	81	40	90

of hypoproteinemia on the digestive tract includes marked retardation of small bowel motility, as measured by the time required for barium to go from the pylorus to the cecum. The formation of radio-opaque callus after section of the ulna in the dog was found to be greatly delayed (17).

Table 5 presents the effect of hypoproteinemia on the susceptibility to hemorrhagic shock. Here again the effects are unmistakable. Table 6 shows work on various dietary requirements on the susceptibility of rats to infection, as found by Robertson and Tisdall (19).

Thus, it would appear that there is ample evidence that hypoproteinemia is a serious handicap for surgical patients and, undoubtedly, its effects are harmful to many groups of medical patients as well. It is evident that its development depends partly on the protein intake, partly on the requirements of the body, partly on the ability of the body to use what protein is ingested, and partly on the catabolic response, if that exists, following a major operation.

PRESURGICAL NUTRITIONAL BUILD-UP

In considering the means of providing for the nutritional requirements of various groups of the population, the discussion will be restricted largely to surgical patients. In this group, many of the patients who are most difficult to manage are the very patients who have long-standing nutritional deficits prior to operation. Many schemes have been advocated to build up the nutritional reserves of such individuals before operation is carried out to relieve their difficulties. Preliminary jejunostomies have been proposed, but in our experience, diarrhea has resulted only too frequently after jejunostomy when the intake is raised to high levels, thus negating the value of the nutritive regimen.

TUBE FEEDING

The ideal way to feed all of these patients is by mouth. However, many of the patients most in need of nutritional therapy are unable to take any considerable amount of food by mouth. For this reason, various methods of tube feeding have been introduced, using a two-lumen tube as originally constructed by Abbott and Rawson (20). When the method was first conceived, it was uncertain whether it was necessary to give predigested protein into the jejunum. Such evidence as we obtained, however, indicated that it was not and that even the postoperative patient was, in general, able to handle whole protein satisfactorily. It is known from earlier studies that the stomach normally dilutes hypertonic foods until they are approximately isotonic. Thus, if one puts 50 per cent glucose in the stomach, measurements indicate that the concentration in the duodenum is seldom above 7 per cent, and in the je-

FIG. 1. *Twenty-hr. gastric retention eighteen days after a Polya-Mayo operation. The retention was associated with hypoproteinemia.*

FIG. 2. *Same patient a few days later when the serum protein had risen to 8.3 gm. per 100 cc. blood. Complete gastric emptying required 40 min.*

TABLE 7

Nitrogen balance studies of Koop et al. (22) on patients receiving protein hydrolysates parenterally

PATIENT	INFUSION	INTAKE				TOTAL NITROGEN OUTPUT	DAILY NITROGEN OUTPUT
		Total nitrogen	Nitrogen	Hydrolysate nitrogen	Energy		
		gm.	*gm./kg./day*	*gm./kg./day*	*calories/kg /day*	*gm.*	*gm.*
To	Rask AA	60.3	0.26	0.26	34	−11.8	−2.3
Ki	Rask AA	86.7	0.28	0.28	39	−21.4	−4.2
McL	Amigen 5%	90.0	0.30	0.30	19	−27.4	−5.4
Du	Amigen 5%	103.8	0.30	0.30	30	−29.8	−5.9
Ja	Casein aminosol 5%	77.9	0.27	0.27	31	−11.9	−2.3
Ah	Casein aminosol 5%	97.0	0.30	0.30	36	−1.1	−0.2
Go	Fibrin aminosol 5%	100.5	0.31	0.31	33	−12.7	−2.5
Wh	Amigen 5%	64.2	0.20	0.20	31	−0.7	−0.1
Ha	Amigen 5%	87.9	0.29	0.29	17	−44.9	−8.9
Po	Casein aminosol	189.0	0.69	0.69	40	40.4	8.0
Ca	Fibrin aminosol	140.5	0.62	0.62	38	21.4	4.2
McC	Fibrin aminosol	130.5	0.54	0.54	39	25.4	5.0

junum it is constantly below 5 per cent. It is not surprising, therefore, that when hypertonic fluids are administered into the jejunum, diarrhea often results. Alternatively, the hypertonic solutions may draw fluid into the lumen of the bowel in a localized area producing distention with a resulting symptom complex, often described as "the dumping syndrome," because it has often been seen after gastroenterostomy and has been correctly interpreted as evidence that food is dumped out of the stomach prematurely.

Perhaps our most successful formula for tube feedings was a mixture of skim milk and skim milk powder. Zollinger and Ellison (21), however, reported good results with homogenized whole milk. In either case, it is probably wise to add a little paregoric if the patient shows any tendency toward diarrhea.

Unless one puts an Abbott-Rawson tube in place routinely at the time of operation, it is generally impossible to have it in proper position subsequently. Therefore, if difficulty with oral intake should arise unexpectedly in a patient who does not have such a tube, it is necessary to resort to parenteral routes. For nutritional purposes, there is no doubt that the intravenous route is the most successful of these. The subcutaneous route is limited as to the amount and concentration of nutrient material which can be absorbed, and the risk of serious infection is considerable when nutrient materials are added to the solution.

Intravenous alimentation as currently carried out consists chiefly of giving glucose and protein hydrolysates. If one desires to meet basal requirements, it is generally necessary to go up to 15 per cent solutions and give 3000 to 4000 c.c. Such solutions produce considerable venous thrombosis in many individuals. However, it was found that in about two-thirds of the patients it was possible to carry out such a program for at least five days after operation, provided the site of injection was changed one or two times every 24 hr. The occasional patient will stand a much more prolonged injection at a given site. On the other hand, a certain number of patients develop thrombosis so quickly that it is practically impossible to continue on such a regimen.

CALORIE-NITROGEN RELATIONSHIP

Much has been written to the effect that one need only give 100 gm. glucose and that this will enable the body to draw on its stores of fat for the remaining caloric supplement. This is not entirely in accord with the studies of Zollinger and Ellison (21), who found that nitrogen balance improved, as one would expect, at successive levels of caloric intake. Therefore, a regimen consisting of 100 gm. protein hydrolysate and 100 gm. carbohydrate may perhaps be regarded as a stop-gap regimen. It is a great deal better than nothing, but it does not meet an adult's caloric requirements.

Ethyl alcohol has considerable nutritive value and its addition to a mixture of 5 per cent amino acid and 5 per cent dextrose makes it possible to achieve caloric balance within a reasonable volume in the patient who is not under stress. While most patients seem to tolerate such a mixture quite well and some of them definitely benefit from the mental relaxation produced by the alcohol, the author does not feel full confidence in recommending it as a routine regimen.

The preparation which would make it easy to achieve caloric balance as well as nitrogen balance would be a stable fat emulsion suitable for intravenous use. We have had small amounts of such emulsions from experimental batches, but no one has yet found a way to produce completely satisfactory fat emulsions. Occasional batches are satisfactory but intervening batches, apparently prepared in the same way, frequently prove to be pyrogenic.

The results of parenteral nutrition in the early

TABLE 8

Nitrogen balance studies by Koop et al. (22) on patients receiving enteral feeding at levels to compare with parenteral feedings in Table 7

PATIENT	TYPE OF FEEDING	INTAKE			TOTAL NITROGEN OUTPUT	NITROGEN BALANCE (total nitrogen in 5 days)
		Total nitrogen	Nitrogen	Energy		
		gm.	*gm./kg./day*	*calories/kg./day*	*gm.*	*gm.*
Be	Amigen	78.7	0.27	26	65.3	13.4
Sc	Gastrostomy	58.5	0.27	32	61.3	−2.8
Po	Gastrostomy	64.5	0.28	31	72.7	−8.2
Do	Amigen—hospital diet	109.5	0.30	30	106.2	3.3
Br	Amigen—hospital diet	88.2	0.30	33	77.1	11.1
Cl	Amigen	75.0	0.30	33	69.6	5.4
Ga	Amigen	100.0	0.30	34	81.4	18.6
Ch	Lactalbumin hydrolysate	70.5	0.30	36	54.1	16.4
Ba	Lactalbumin hydrolysate	98.0	0.30	37	91.1	6.9
To	Gastrostomy	73.6	0.34	34	68.8	4.8
Bru	Gastrostomy	160.0	0.63	35	134.8	25.2

TABLE 9

Average nitrogen balance with enteral and parenteral feedings after surgery

TYPE OF FEEDING	NUMBER OF PATIENTS	AVERAGE NITROGEN INTAKE	AVERAGE CALORIC INTAKE	DAILY AVERAGE NITROGEN BALANCE
		mg./kg./day	*calories/kg./day*	*gm./day*
Enteral	8	289	29.9	3.6
Parenteral (hydrolyzed protein)	10	289	32.6	−2.8

postoperative period are shown in Table 7, and for purposes of comparison, a group of patients given roughly similar amounts of protein and carbohydrate are presented in Table 8. Table 9 shows, in summary form, the difference in results obtained by these two methods and bears out the contention that food given via the alimentary tract is, in general, better utilized than that given intravenously, albeit the latter is well worth while.

VALUE OF MEAT

It is clear from studies of surgical patients that the great need is for an adequate protein intake, by a route that will insure reasonable absorption and utilization. All too often, in hospital practice, we are forced to resort to transfusions of blood and plasma. Indeed, it has been said that, in some hospitals, a transfusion is easier to procure than a beefsteak. I am convinced that what many of our patients need most is generous intake of highest quality meat, suitably supplemented and appetizingly served. Granted that many hospitals cannot afford this on a routine basis, nevertheless, most could afford it in particular situations and it would seem that some method could be found to give special attention to the minority of patients who really need it, without offending the larger number who fare very well on any ordinary dietary regimen.

With reasonable cooperation from hospital administration and medical staff, there is a tremendous amount which the dietitian can do to help the ill patient. Sometimes it is a question merely of making a sufficient allowance for the extra nutritive requirements which accompany fever or which follow trauma and stress. Sometimes there are psychic difficulties to overcome or personal tastes which must be catered to if the patient is to be coaxed into an adequate intake.

On other occasions, it is of inestimable value to serve the patient measured food, and to collect the trays afterwards and measure the amount of food rejected. In this way, one can calculate the protein and calories consumed from day to day. If these figures are shared with the patient at appropriate intervals, they frequently serve as a great stimulus to him to take more nourishment.

Such tabulations of the actual protein intake generally come as a shock to the clinician who assumes that if he has ordered a 3000-calorie diet, the patient will probably get at least 2500 calories. Frequently, measurements and calculations show that the actual intake is only 1000 or 1500 calories. Here, even without nitrogen balance studies, it is fairly clear that the patient is not getting a maintenance intake.

VITAMINS

I have not said much about vitamins. This has been partly intentional. Too little is actually well established regarding the vitamin requirements of patients during stress. We know that after severe burns, the amount of ascorbic acid which must be administered to produce an increase in ascorbic acid output is very great indeed, of the order of 1000 to 2000 mg. per day. Furthermore, the ascorbic acid content of the adrenal has been found to be reduced. It is common practice, therefore, to give patients with burns very large amounts of ascorbic acid for several days and to continue with fairly large amounts after that.

The B vitamins are undoubtedly important in regulating gastrointestinal function and, if for no other reason, we believe they should be supplied for a period after extensive gastrectomy.

Thiamine deficiency is especially apt to develop during fever and hyperthyroidism. During thyroid storm it is believed that the requirement may go up at least fourfold. Riboflavin is apparently deposited in the body during periods of protein synthesis and excreted during periods of protein breakdown. Therefore, it may be high in the blood stream at a time of negative nitrogen balance and vice versa.

Today, patients are undergoing operations of a therapeutic nature under circumstances in which they would have been declared inoperable a few years ago. This is putting an extra burden on the teams which supply nourishment to the patient. In the critical patient who is ill for longer than the usual period of time, the dietitian can make her greatest contribution. Here, an active and adequate nutritional regimen will frequently shorten the convalescence and apparently lower the incidence of complications, and I am sure that such a regimen often tips the scales toward recovery in patients who would otherwise be lost. Many of these patients will recover complete health once they are over the hump and will live many active years.

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GRACE BULMAN
President, The American Dietetic Association

Editorial

GRACE BULMAN, PRESIDENT OF THE AMERICAN DIETETIC ASSOCIATION

The spirit and accomplishments of an organization are the reflection of its leadership. In view of this, The American Dietetic Association will undoubtedly record a noteworthy year under the guidance of its new President for 1953–54, Grace Bulman.

Many probably know her as a petite, gray-haired person with lovely soft brown eyes, outstanding for her sound judgment and action, but blessed with a surplus of modesty. Each member should grasp every opportunity possible to know her better and to appreciate her abundance of admirable attributes. This trait of her modesty curtails the writer from relating all the many fine things she has learned about Miss Bulman during the close professional association of the past few years.

She was born in Baltimore, Maryland, one of a family of four girls. Due to the very early death of their father, her mother took the "little women" and returned to her Virginia home. This lovely country place became literally a private school for girls and a happy environment to be remembered.

Filled with ambition and coping with not too few adversities along the way, Grace Bulman graduated from Drexel Institute and received a B.S. degree in institution administration from Columbia University. More recently, she completed her M.S. degree at George Washington University. After receiving experience as a student dietitian at Bellevue Hospital, New York City, she was ready to start her career as a dietitian. Her hospital service began with a memorable appointment—as a dietitian with the American Expeditionary Forces in France in 1918–19. At the completion of her military tour of duty, she received an assignment with the U. S. Public Health Service and in 1922 was transferred to the Veterans Bureau when that agency was established. For the next few years she served as a dietitian in various Veterans Hospitals over the United States. In 1928 when the need arose for a new leader of dietitians in the Medical Service of the Veterans Administration, Central Office, in Washington, she was the one of choice because of her record as a fine dietitian with unusually sound judgment.

Although Miss Bulman has remained with the same organization, her professional enthusiasm and achievements have been far from static. Through the years, her intelligence, sage decisions, and understanding of people have attained many of the goals for a good food service which had been forced to remain in her plans and dreams too long. Now she is the Director, Dietetic Service, Department of Medicine and Surgery of the Veterans Administration with approximately 100,000 patients in 162 hospitals depending on her guidance to provide the nutritional needs important for their recovery.

Her life has been filled with much more than the everyday job. Besides faithfulness to her family and wide circle of friends, she has always been active in The American Dietetic and District of Columbia Dietetic Associations, in the American Home Economics Association, and with allied professional groups. Among her participations in American Dietetic Association affairs she served as Administration Section Chairman, 1939–40; Vice-President, 1949–50; Chairman, Program Planning, 1950–51; and President-Elect, 1952–53. In 1948 she was the recipient of The American Dietetic Association's highest honor—the Marjorie Hulsizer Copher Award. She was elected to the Board of Directors of the National Health Council in March 1953. She is also Veterans Administration liaison representative to the Food and Nutrition Board of the National Research Council.

Endowed with warmth of personality, loyalty to service and professional ethics, and the ability to find solutions to seemingly insurmountable tasks, Grace Bulman, our President, brings to us just anticipation for a coming year of attainment.—*Jean Crooks, Chief, Nutrition and Diet Therapy Division, Dietetic Service, Veterans Administration, Washington, D. C.*

Current Comment

DIETETIC ASPECTS OF NURSING CARE[1]

LUCY D. GERMAIN, R. N.

Director, Departments of Nursing and Nursing Education, and Assistant Director, Harper Hospital, Detroit

Fashions in 1873 were different from those of today! So were the schools of nursing. That year marked the first Nightingale schools in America. They were in the East. Ten years later found another in Detroit. The curriculum of each included simple foods and cookery and how to set up an attractive and appetizing tray. There were no dietitians as we know them today; food preparation was part of nursing. So were many other activities now handled by the housekeeping and dietary departments and the pharmacy.

Eighty years have made tremendous changes. Medical science has progressed to include many practices based on chemical reactions in the human body. The dietitian has her place in the sun as an important member of the health team. The professional nurse is a co-worker of the doctor, the social worker, and the dietitian. Each participates in a program planned to help the patient recover from illness and to teach him good health practices and to be a cooperative citizen in improving his own and community health.

Nursing has emerged as a young profession which is endeavoring to prepare its members to be constructive workers in the field of health. Former practices which were (and still are) prevalent in the apprenticeship method of learning are now giving way to educational experiences based on individual needs of both the patient and the student nurse. Designated periods of time spent in the dietary department or in the operating room or in a particular clinical area are now taking on new emphasis. Learning takes precedence over service, but giving service is an important part of learning. This is a growing trend. If analyzed, this is really a new approach to a long-established goal—teaching selected young women who enter nursing the art, science, and human values essential to the welfare of people.

FORMER CURRICULUM

You are familiar with the 30 hr. instruction in foods and cookery, the 15 hr. in nutrition, and the 15 hr. in diet therapy, also the four to six weeks which the student formerly spent in the diet kitchen. The student was required to carry out tasks which maids could have done just as effectively. To her, mealtime was a chore because trays had to be passed and the job was an end in itself rather than one avenue to recovery for the patient. She was taught how to plan and prepare a diabetic diet or how to modify other diets according to the doctor's prescription. In some schools, the classes in foods and nutrition were separate entities with little correlation with nursing and medical facts pertinent to a patient with a disease. The student nurse learned how to prepare a formula but not necessarily to know the baby who received the formula. In nursing classes, she learned the importance of encouraging a patient to eat but maybe she needed far more understanding of his moods and his family in order to motivate him to eat foods suitable to his needs. "Force fluids" or "high-calorie" diets were empirical orders to carry out because the doctor said so, and she did not necessarily know why they were really essential to the patient's welfare. Her own nutritional needs were frequently by-passed until better health programs became necessary in a good school of nursing. The extent to which the student practiced good dietary habits had little consideration until schools began to strengthen the basic education for nursing. Many new areas were included, among which was the development of the student herself according to the individual's ability and potentiality.

OBJECTIVES OF NURSING EDUCATION

The objectives of a school of nursing determine the pattern for the program of the school. Simply stated, these are:

(a) To develop each student physically, mentally, and morally to the fullest capacity so that she may function in the best interests of those whom she serves as well as with maximum satisfaction to herself.

(b) To prepare the student to practice in all areas of clinical nursing with an appreciation for people as individuals.

(c) To develop beginning qualities of leadership and understanding in addition to nursing skills, so that as a graduate nurse she may perform effectively as a first-level practitioner of nursing.

(d) To enable the professional nurse to coordinate the services of all personnel who assist with the nursing care of patients.

(e) To prepare the student to function in general and special hospitals and other community agencies.

[1] Presented before the Michigan Dietetic Association in Detroit, on April 17, 1953.

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These imply the preparation of the student for nursing in many occupational posts—in large and small communities, in hospitals and public health agencies, here and abroad. It is important, too, that the selective process provides young women who are capable of personal and professional growth. On the other hand, the school must recognize its responsibility to the student by expanding and changing its program as indicated by the health needs of the people. During the last two decades, several new areas have been apparent in the nursing curriculum. Among these are: (a) the inclusion of tuberculosis and psychiatric nursing and the social and health aspects of nursing and (b) the approach to the care of patients from the standpoint of growth and development with increasing emphasis on geriatrics.

PEOPLE-CENTERED TEACHING

Today there is a trend in teaching which definitely influences the learning opportunity for student nurses in the field of nutrition. The pendulum has swung from formal classroom teaching to more teaching on the wards close to patients. The arrangement of subject matter places the emphasis on the *patient*. This necessitates the concentration of specified subject matter from a number of disciplines rather than a more limited view of nursing care. Nurse educators plan to include the total aspects with which the nurse may be confronted, e.g., dietetic, nursing, social, psychiatric, and public health. Other emerging needs for the student nurse are learning to work in a team and developing leadership characteristics, as well as those skills which make the professional nurse socially acceptable and a safe practitioner.

The environment in which the student learns to nurse is also changing. Even "bedside" nursing is no longer adequate because early ambulation has permitted the patient to care for himself more quickly. "Patient-centered" learning experiences are considered essential. Of late, even this is taking second place, allowing a "people-centered" concept to predominate. Where once the climate was created wholly by student and professional nursing personnel, it now depends also on practical nurses, nursing aides, and clerks. Usually these are referred to as members of the nursing team, or more aptly as nursing personnel who, as a group, care for patients. Another team referred to earlier is that of the doctor, dietitian, nurse, and social worker. They also contribute to the teaching of the student.

It is readily understood how these and other changes influence the teaching of dietetic knowledge necessary to good performance in nursing. It is essential that both the director of the school and her faculty, and the director of dietetics and her staff understand the need to alter the pattern of instruction. A basic premise is that a student nurse is primarily a student and the service she gives in any hospital department is incidental to her learning. This assumes another premise, namely, that day-to-day service tasks are performed by employed personnel, the student carrying out these same tasks under supervision only according to her needs.

THE DIETETICS INSTRUCTOR

Dietetic aspects of nursing care are sufficiently important to merit a full-time instructor. Desirable as this may be, it depends on the size of the school of nursing. Her appointment should be approved jointly by the director of the school of nursing and the director of dietetics. She should be on the payroll of the school. She should hold at least a Bachelor of Science degree in home economics with an internship in dietetics approved by The American Dietetic Association. Ideally she should have had teaching experience or possess an interest in this field. It is desirable for her to have had some contact with nursing or if not, this can readily be acquired in a well-planned orientation program.

Although a full-time faculty member in the school, it is well for her to be anchored in the dietary department. By this is meant that the association with her major field, namely dietetics, should remain close. Her office (which should be similar to those provided other instructors) may be either in the school or in the dietary department. She should be free to plan her own program, give counseling to students, attend committee meetings, and participate in all activities of the school of nursing. Like other instructors, she serves as a consultant in all clinical areas of nursing, making suggestions related to the content of instruction in both normal and modified diets and other dietary aspects of the situation.

Especially, should she be active in the educational program for nursing service personnel. This provides an avenue through which the nursing service personnel may acquire an adequate background in nutrition in order to provide an optimal environment in which student nurses learn to nurse. Likewise, it is anticipated that the instructor will not only teach the formal classes in foods and cookery, nutrition, and diet therapy, but be a regular resource person in all ward teaching in medical and surgical nursing, obstetric and pediatric nursing, and tuberculosis and psychiatric nursing in both in-patient and out-patient areas.

The dietetic subject matter will vary, just as other course content changes with the times. A workable knowledge of the rudiments of cooking is essential so that in later practice the nurse may meet the demands made on her. An attractively arranged tray performs wonders when a person is ill. Normal nutrition is essential. Frequently a real understanding of a patient comes through meeting his oral needs. These may be actual or fantasy, but to the patient they mean personal satisfaction or dissatisfaction. The modification of the normal diet is play-

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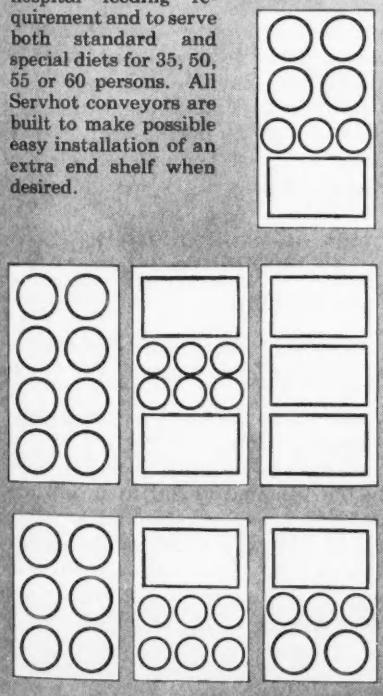

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ing an increasingly important role in medical treatment. This, too, the nurse must know; otherwise her ability to work in a team may be jeopardized.

ADMINISTRATION'S AREA IN EDUCATION

The details of course content, sequence of subjects, and specific classes belong to the curriculum planners, but certain elements of method belong in the realm of administration of the nursing school, such as:

(a) The content and method of instruction should be reviewed at least annually in order to assure "up-to-dateness." This is the responsibility of the instructor in nutrition working cooperatively with the curriculum committee of the school and representatives of the dietary department.

(b) The dietetic knowledge essential in nursing rightly belongs in the dietetic courses, but application of the principles and knowledge belong in all other courses in the curriculum. Unfortunately, this is frequently omitted, either for lack of time or understanding. The dietetics instructor can play a tremendous role in teaching the new mother the care of her baby or assisting the nurse to teach the patient with diabetes about his personal care after discharge from the hospital. Here, too, the student nurse and the dietetic intern might well learn to function together under supervision. In later years of practice, group participation in carrying on their jobs would come more readily.

(c) Patient-centered assignments in dietary experience assure more contact with patients and hence more emphasis is given to food needs. Rather than assigning a group of students to the dietary department for four to six weeks, how much better if the experience were so arranged that the instructor: (1) assigns students to patients for bedside care; (2) holds conferences discussing nutritional needs; (3) teaches students to plan trays for patients with special dietary problems; (4) allows students to help patients to eat or observe them eating; (5) has students participate in clinical programs; and (6) arranges observation periods in the dietary department to see how food is purchased, prepared, and served together with the daily situations which must be met if patients are to feel secure and satisfied.

(d) Physical teaching and learning facilities should be as adequate as for other subjects in the curriculum, i.e., reference books and periodicals in the library; a classroom well equipped with necessary supplies and simple kitchen needs, together with the essentials for making formulas; and some place where modified or therapeutic diets may be determined under supervision apart from the hustle and interruptions prevalent in service areas.

(e) Provision for dietetic learning in relation to all levels or areas of practice is essential. The dietetics instructor participates because each nurse instructor relies on her. In nursing arts, students learn simple passing of food trays, and preparation of patients for their food which is customary from the physical standpoint, but their learning should also include the mental point of view. Students can learn much in relation to nutrition in medical, surgical, pediatric, tuberculosis, obstetric, and psychiatric nursing. They learn how to meet dietary needs of people in the hospitals and at home. This can be accomplished only when all instructors have time to plan and are well qualified in their respective fields.

There is much to be gained in such a program for students in basic nursing education. Essentially, however, it is one of emphasis and viewpoint. Students are placed in a learning atmosphere where they are most likely to develop their own abilities. They see patients as individuals who have certain dietary needs and learn how to meet them according to age, physical condition, and likes and dislikes. They cannot help recognizing that although basic knowledge may remain the same, research in the various sciences influences dietetic management in disease and health. There is far more to successful dietetic practice than arranging attractive trays and using delectable and palatable foods. Unless the student learns how to obtain the cooperation of the patient who should receive specified foods, her work is to no avail. It is relatively simple to learn how to give a bath and cook food, but to know why some patients should care for themselves and eat only selected foods cooked under certain conditions requires scientific knowledge applied to the welfare of man.

Teaching the dietetic aspects of nursing care is an important phase of the program of the school of nursing. The pattern described here is being initiated in an increasing number of schools. It is in keeping with similar curriculum changes which strengthen the understanding of public health, the growing child, and psychiatric aspects of patient care. It should be more meaningful to the student when she finds herself exposed to dietetic needs of patients in the hospital. It is further anticipated that the student will be more aware of her own nutritional needs and through this make sure that her nursing activities reflect her own understanding of the needs of others.

INSTRUCTION OF MEDICAL STUDENTS IN NUTRITION

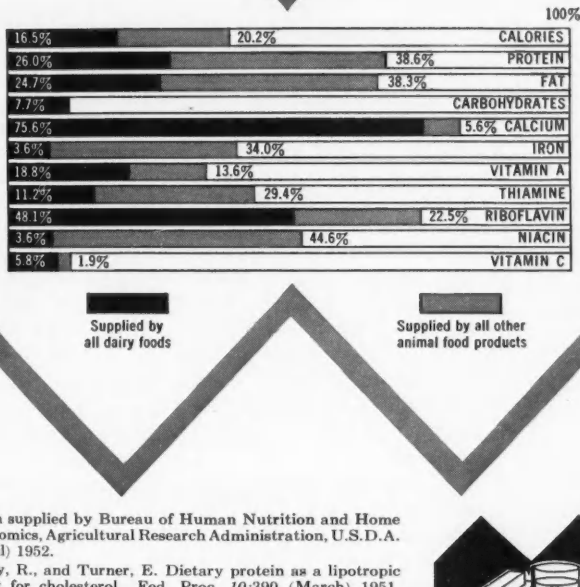
ELMIRA E. BLECHA

Instructor in Dietetics, Veterans Administration Hospital, Houston

On at least four occasions in the past twenty years, the Professional Education Section of The American Dietetic Association has collected information concerning the teaching of nutrition and dietetics in medical and dental schools. These efforts have been aimed at learning methods of cooperation and means of instruction which have seemed to be successful. Because of increasing interest, this project

CHOLESTEROL and animal food products

Percent contribution of various nutrients made to U. S. food supply by all animal food products.



FOODS of animal origin (milk, cheese, meat, eggs, etc.) combined with plant foods are needed for optimum nutrition.

About two-thirds of our protein comes from animal foods.[1] Most animal protein has a high biological value, by virtue of its content of essential amino acids. Animal foods are also a source of vitamin B_{12}, a factor necessary for red blood cell regeneration. There is evidence that the presence of animal protein foods in the diet favors normal lipid metabolism.[2]

Four-fifths of our calcium comes from animal foods, chiefly from dairy products. Without dairy foods it is exceedingly difficult to meet the requirements for calcium. Animal foods also supply three-fourths of our available riboflavin, one-half our niacin, and one-third of our thiamine.[1] These and other vitamins are necessary for normal cellular metabolism.

Animal foods contain cholesterol, a lipid which is a normal constituent of all body cells, and which is synthesized by the body from substances derived from protein, fats, and carbohydrates. Disturbed lipid metabolism may result in deposition of cholesterol with fatty acids and protein in the inner walls of the blood vessels. This condition, atherosclerosis, is a forerunner of a number of cardiovascular diseases.[3]

Atherosclerosis is frequently associated with obesity, diabetes, and other metabolic disorders.[3,4] The cause of atherosclerosis has not been determined. Restriction of dietary cholesterol by elimination of animal foods has not been shown to be beneficial in its prevention or cure.[4]

The omission of the valuable nutrients found in these foods constitutes a nutritional risk not justified on the basis of currently available evidence.[5]

[1]Data supplied by Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, U.S.D.A. (April) 1952.

[2]Okey, R., and Turner, E. Dietary protein as a lipotropic agent for cholesterol. Fed. Proc. *10*:390 (March) 1951.

[3]Gofman, J. W. and Jones, H. B. Obesity, fat metabolism and cardiovascular disease. Circulation *5*:514 (April) 1952.

[4]Keys, A. Human atherosclerosis and the diet. Circulation *5*:115 (Jan.) 1952.

[5]Hegsted, D. M. Further comments on cholesterol. Presented before American Medical Association, Los Angeles, December 1951.

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has been reactivated. The committee[1] prepared a questionnaire which was sent to approximately fifty hospitals and universities. Of the thirty replies, twenty-three were teaching nutrition in varying amounts, while seven were not.

Two schools give credit for the course; seventeen require the course in the junior or senior years, usually in conjunction with the section on medicine, but do not give separate credit for it. Three schools offer classes in nutrition or diet therapy, but attendance is optional.

Due to a fault in the questionnaire, it was impossible to determine exactly the number of classes offered each student, but the classwork appears to vary from 2 to 24 hr., the majority being 8 hr.

The teaching methods used vary considerably. In schools where large groups attend the classes, lectures, discussion, and demonstration are chiefly used. Where two or three students are assigned at a time, conferences predominate.

A number of outlines of study were submitted, and the committee received several requests for outlines of subject matter.

Realizing that no one outline of course content would be applicable in every situation, the committee prepared a sample course outline including objectives, subject matter, and teaching aids which it hoped could readily be adapted locally.

Objectives

The following objectives are compiled from the survey and supplement the committee's thinking.

(a) To acquaint the student with the importance of diet to the well-being of the individual.

(b) To present reasons for the necessity of a good dietary history.

(c) To acquaint the student with the hospital dietary department and to give him some understanding of the problems involved in hospital food service.

(d) To present methods of maintaining adequate nutrition in various physiologic conditions as well as an understanding of each therapeutic diet as a modification of the normal diet.

(e) To stress appreciation of the importance of the patient's understanding the reason for the diet.

(f) To recall psychologic disturbances which often accompany illness and affect attitudes toward food.

(g) To present the material in such a manner that the students can tell patients what to eat in terms of food with sufficient flexibility that the regimens will be acceptable to the patients.

Course Content

The following subject matter is merely suggested for inclusion in classes and in no way implies an ideal number of classes, order of presentation, or completeness of content.

NORMAL DIET

What is normal diet? How does it vary with age and activity? What references on the food needs of the healthy individual are available? To try to clarify the many questions regarding an adequate food intake, it seems worth while to review the way in which the Recommended Dietary Allowances were established by the Food and Nutrition Board of the National Research Council. The interrelationships among the various nutrients could be pointed out, e.g., the increased need for thiamine when carbohydrate intake is increased.

How can this information be made practical for Mr. and Mrs. John Doe? The basic food groups might be used as an example of a daily pattern to insure adequacy of intake. What are the major nutritional contributions of each group? How can the pattern be altered to allow for individual preferences?

How are infant formulas prepared? What are some of the common variations and when are they used? Compare costs. What is considered to be a normal diet for young children? In what respects is the normal diet modified to meet the dietary needs during adolescence, pregnancy, and lactation?

DIETARY HISTORY AND INSTRUCTION

There are many times when there is an urgent need for diet therapy. The problem is how to "get it across" effectively. Everybody eats. Many people have had years of experience in eating, and consequently consider themselves authorities on the subject of foods and their effects. For this reason, before suggesting changes, it is essential to take a dietary history to obtain information on the patient's meal patterns and how his economic status, religion, and cultural background affect his food habits. In clinical work, this type of history serves a useful purpose prior to planning a patient's diet but is not accurate enough for research purposes.

Since habits are notoriously hard to change, it is especially important to adapt the dietary prescription as closely as possible to the patient's food habits. A change in one's diet deserves the same care and consideration as anything else which affects him as a person. In situations where there is no control, such as an out-patient, one can expect adherence to a dietary regimen only if the patient is "sold" on its value to him.

Both individual and group instruction are valuable. In individual instruction, one can concentrate on a "tailor-made" plan for the patient. If this is followed by group instruction, problems common to the group can be discussed, ideas exchanged, and usually the morale is improved because members of the group face the problems together.

It should be pointed out that "factory-made" diet

[1] Dorothy Vorhies, Meredith Jones, and Elmira Blecha, Chairman.

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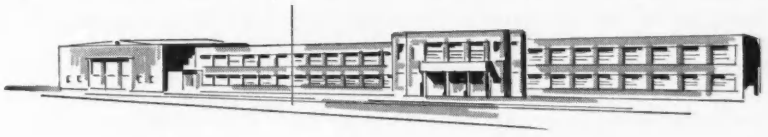

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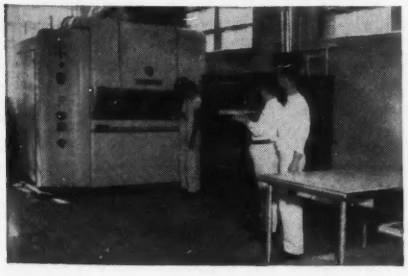

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sheets that are handed out are impersonal, impractical, and the main reason for unsatisfactory results in diet therapy.

SHORT METHODS OF ANALYZING DAILY FOOD INTAKES

There must be some satisfactory short cuts for calculating diets. We will never have time to figure everything a patient will eat. What food table is best? These questions provide an opportunity to evaluate various food tables as to when they might be used to the best advantage. By way of illustration, one would hesitate to use detailed food tables for ordinary diet planning where the foods vary from day to day, because such figuring presumes a degree of accuracy which is impossible to attain. Shortened methods for analyzing food intakes or calculating diets have been prepared by averaging values for similar foods, making it possible to figure a diabetic or low-sodium diet in 2 to 3 min. This has proved satisfactory in the usual clinic situation. In research studies, foods would need to be calculated individually and then usually analyzed chemically to determine exact values.

MODIFICATIONS OF NORMAL DIET FOR THERAPEUTIC PURPOSES

Present-day thinking promulgates the use of the modified normal diet for therapeutic purposes, in the belief that nutritive efficiency will be more readily attained. Special needs in disease are, of course, recognized—and have been pointed up in the recent publication *Therapeutic Nutrition* (2). In most instances, these needs may be met by increasing or decreasing the intake of certain food groups, by substitutions, or by omissions or additions.

Modifications in Consistency. What is meant by a low-residue diet? How does it compare with low-fiber diet? There is much confusion regarding terms used to denote consistency. These need interpretation. The application and limitations of these modifications of consistency, as well as the effect on nutritive content, acceptance, color, and taste are worth discussing.

Modifications in Protein, Fat, and Carbohydrate. For practical diet therapy, a review of the food sources of these nutrients, the need for them, the significance of various levels of intake, and factors influencing utilization is indicated. Real problems involved in some of the combined modifications, e.g., 150 gm. protein and 50 gm. fat, might be calculated in terms of foods and set up in meals to illustrate how difficult such a prescription is to achieve. With so many protein concentrates and hydrolysates on the market, it is interesting to check the protein content against the amount and cost.

Modifications in Mineral Intake. What foods are the best sources of the various minerals? What are the needs for them, the significance of various levels of intake, and factors influencing utilization? Point out practical problems involved in some of the modifications, such as 150 gm. protein and 200 gm. sodium, high calcium and low phosphorus, or a diet low in potassium.

Caloric Modifications. The patient needs potent motivation to achieve either a satisfactory weight gain or loss; otherwise he would already have done something about it. Foods which are high and those which are low in calories might be reviewed. The following questions are thought-provoking and practical: What is high caloric for a given individual? How can one handle the problems involved in motivating a patient with a poor appetite to eat a high caloric diet? Is there a simple way to estimate weight gain or loss on a specific caloric intake?

Teaching Aids

1. A class taught jointly by a doctor and a dietitian for good coordination of the disease and diet therapy.
2. A patient presentation with the disease and diet being discussed.
3. Films pertinent to the discussion.
4. Slides of interesting material.
5. Blackboard for actual calculation of problems.
6. Food models, as an economical means of setting up the diet under discussion to show sizes of servings.
7. Actual eating of the modified diet. When this is impossible, it is helpful to have samples to taste, such as low-sodium food, food sweetened with saccharin, protein hydrolysates, and so on.
8. Charts and pamphlets.
9. Graphs to show the effects of removal of certain food groups in therapeutic diets.
10. Where possible, actual practice in preparation of quantitative diets.
11. Students actually teaching patients in the clinic.

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(2) Pollack, H., and Halpern, S. L.: Therapeutic Nutrition. National Academy of Sciences—National Research Council Pub. No. 234, 1952.

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Someone has said that a good prescription for the preservation of vigor into the later years is "Equal parts of happiness, good health, good food, good cooking, good places to eat, good people to eat with, and good reasons for eating." If persons in the younger age groups could be convinced of the wisdom of this prescription, undoubtedly much more could be done to maintain a good skeleton, including the mandible and maxilla, than can ever be done in later years to nutritionally retrieve them.—*Nina Simmonds, Sc.D., in the Journal of Prosthetic Dentistry 2: 746 (November), 1952.*

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Gunther, M.: Brit. J. Nutrition 5 (No. 2): 215, 1952.

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The President Goes on a Pearl Harbor Cruise

BEULAH A. HUNZICKER

President, The American Dietetic Association

A cruise in May on a hospital ship to Pearl Harbor and a visit to Navy installations in that area sounded like a fairy tale when the admiral issued the invitation. But it was a reality, when on the U.S.S. *Repose*, a beautiful white hospital ship with gleaming red crosses, I set sail from Long Beach with thirteen other women and a naval escort.

Our group represented several areas of interest. In the professional group were a doctor, two nurses, an occupational therapist, a physical therapist, and a dietitian (myself). In addition to these medical and paramedical women, there were four representatives of the women's auxiliary boards of hospitals, a member of the National Defense Advisory Committee on Women in the Armed Services, two deans of women from state universities—all of whom were concerned with the personnel and guidance phase of recruitment; and a member of the staff of the Educational Division of the National Broadcasting Company who conducts career programs for radio and television.

Our ship, the U.S.S. *Repose*, had just been repaired and restaffed and was on its way to active duty in Korean waters. It would stop at Pearl Harbor for inspection, and there our group would disembark. There were, of course, no patients on board on this leg of the voyage. Our group was stationed in the "sick officers" quarters. Almost daily tours and briefings acquainted us with the ship and how it would function as a floating hospital. We were free to go about the ship, visit any area, and ask questions of any of the personnel.

The purpose of the trip at first puzzled me, but as each day passed I realized that the Navy was showing us, in a way that could not be taught by telling, how it is equipped to take care of our sick and wounded.

The ship is a 700-bed hospital, actually a seven-floor building occupying the entire central portion of the ship. The hospital provides the usual specialties, that is: surgery; dentistry; ear, nose, and throat; internal medicine; radiology; pathology; and so on. The compactness and completeness of its facilities were amazing. With a helicopter landing platform on deck, patients may arrive less than ½ hr. after being injured, and we were told that only minutes elapse after landing before patients are in the operating or dressing room. The ship operates as a base hospital in a war area, moving as the sector of operation changes.

Food service on the ship followed the regular Navy pattern. The officers, chief petty officers, and enlisted men had their own galleys which were operated independently of each other. The supply officer, who purchased all supplies for the ship including food, was in charge of the enlisted men's galley—which, of course, was by far the largest. It was supervised by a chief petty officer, working directly under the supply officer. Food for the hospital patients was also prepared in this galley, being carried to the serving area by dumbwaiter. A special diet kitchen was situated in an area of the main galley. We were told that a large portion of the therapeutic diets were formulas. The officers and chief petty officers operated their own galleys, planned their own menus, and purchased the food they wished from the supply officer or bought it while in port. A copy of the Navy's standardized recipes was in each galley.

Navy life—reveille came over the "squak box" every morning at 6 o'clock. Then came the call to "scrub down the weather decks and polish all brass." The sound of the swish of water followed as the Navy tended to its housekeeping duties, and we knew it was time to get up. We breakfasted each morning with the nurses in their wardroom. For lunch and dinner (no slacks allowed), we were rotated at the tables in the officers and chief petty officers wardrooms. We soon had breakfasted, lunched, or dined with each officer. We were also entertained by each of the captains—the captain of the ship's operation and the captain of hospital operation, who, of course, is a doctor.

We arrived in Pearl Harbor after six days of bright sunshine and a smooth sea. As we docked, Hawaiian dancers sang "Aloha," giving us our first feeling of the Islands. I felt I was really welcomed when two members of the Hawaii Dietetic Association met me with leis.

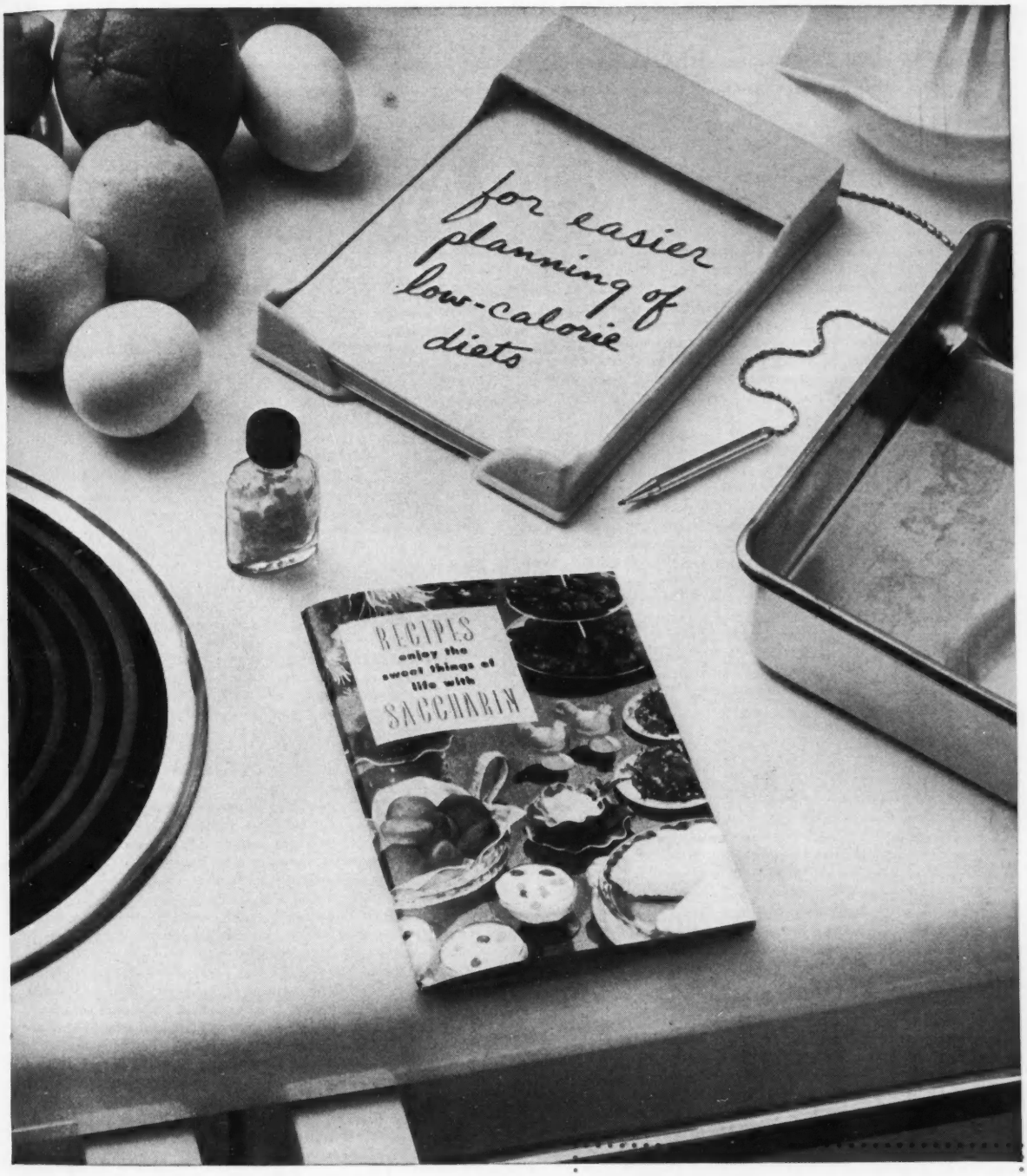
The following week we visited Navy installations at Pearl Harbor and on Oahu and were briefed by Navy officers. The briefing consisted of discussions on the planning for the care and comfort of our servicemen and information on the Korean war. The Marine Corps put on a demonstration of the air coverage for the ground troops. From the lookout tower, we could see the movement of the marines and the fire; hear the guns; and watch the planes approach in perfect formation and unload their bombs. We felt much closer to the war, and it made us realize that there are those to whom we have committed the task of protecting our freedom.

A trip on a submarine was one of our most interesting and perhaps unusual experiences. At 7:00 A.M. we arrived at the submarine dock and were divided into two groups. Each group was assigned to a submarine. We descended the ladders (stairs to landlubbers), arriving in the torpedo room where practice torpedoes rested in the racks. As the submarine headed out to sea to prepare for diving, we were taken on tour, and the operation of the submarine was explained to us. Most interesting were the provisions for feeding the personnel, who are the best fed of our fighting men. Again, there were two galleys and two wardrooms—one for officers and one for enlisted men—each operated for the most part independently. Every facility possible was used to provide good food—for food is an important part of submarine life. The men may be at sea for long periods of time and quarters are sure to become as uninteresting as a hospital room to our patients. Food, therefore, must provide that extra spark to keep up morale. The arrangements of the galleys represented a major feat in equipment planning. After our third dive, we were invited to lunch in the officers wardroom.

One of our afternoons was spent in visiting Tripler Hospital which is operated cooperatively by the Army, Navy, and Air Force. It is the most modern of our overseas hospitals, and one of the largest, with 1500 beds. Here an A.D.A. member, an Army dietitian, showed us through the beautiful, well equipped kitchens and dining rooms.

A highlight of the trip, although extracurricular as far as the Navy was concerned, was the dinner meeting of the Hawaii Dietetic Association. Thirty-five interested, enthusiastic, and gracious members dressed in native mumuus and holakus made up a lovely group. Never could a visiting president be made to feel more welcome. Extracurricular, too, was a visit to a pineapple plantation with an A.D.A. member and her husband to learn the fascinating story of pineapple and the pineapple industry.

After seven days in the "Paradise of the Pacific," we boarded one of the Navy's flying ships and were on our way home. We left Oahu feeling that we had indeed been privileged. To see the care provided for our sick and wounded fighting men, to see the Navy at close range, to sense the fine *esprit de corps* of the personnel had been a rare opportunity. We understood a little better what it means to preserve democracy and our freedom. We also sensed that this freedom is everyone's responsibility. It is not to be had just for the asking.



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Where Tea Means Breakfast and Breakfast Means Lunch

TRANDAILER JONES

Formerly Director of Nutrition Service, Virgin Islands Department of Health, Charlotte Amalie, St. Thomas, Virgin Islands

"Tea is served" is the announcement of breakfast in the Virgin Islands. Both the terms "tea" and "breakfast," as used by Virgin Islanders, are different from the usual meaning attached to them in the continental U. S.

The use of the word "tea" instead of breakfast has come about through the practice and importance which the Virgin Islander attaches to serving a hot beverage first thing in the morning. An accompanying breadstuff of either johnny cake or some locally baked product completes the basic pattern for this meal. As income increases, however, one or more of the following in the order listed is included: butter or fortified margarine, cereal, a protein dish, and fruit.

The use of "tea" as a generic name for a beverage is also interesting. In the Virgin Islands "tea" may mean hot water with sugar and/or milk; any commercial product, such as Ovaltine, cocoa, coffee, or packaged tea; steeped dried fruit peelings or orange or lemon; or any of the selected plant leaves commonly used for making tea. Such leaves are called "bush," and the beverage obtained by steeping any kind or combination of leaves in boiling water is called "bush tea." These teas are regarded with high esteem as a food for nourishing the body and for imparting medicinal effects.

Even more strange to the American is the fact that in the Caribbean area, the meal served at noon carries the name "breakfast."

The Island homemaker must be commended for her skill in food preparation. Kitchen equipment, except in families of high income, consists of a coal pot, a portable cooking unit that burns charcoal, as well as a minimum of storage space and cooking utensils. Also, the absence of home refrigeration necessitates the purchase of perishable foods on a day-by-day basis. Inadequate income and transportation to and from town invariably influence the distribution of the food dollar for non- and semi-perishable foods. In many instances water for food preparation, as well as for drinking and dishwashing, must be carried considerable distances. These are a few problems the Island homemaker copes with in feeding her family. She has, however, demonstrated initiative and resourcefulness in resolving the situation.

Since many homes possess a single coal pot, the custom of cooking all the food in one container is a practical way of surmounting some of her problems. Through this procedure, a number of traditional one-pot meals have resulted, popular among which are *kalaloo*, *masamby*, *maufe*, and a variety of soups. It is customary to prepare these dishes with varying proportions of beef, salt pork, pig tails, and fish along with various colored and starchy vegetables. These dishes are usually served with *fungi*, a breadstuff of yellow cornmeal, or with dumplings. That the one-dish meals should be made to supply sufficient high-quality protein foods and colored vegetables for good health cannot be too highly stressed, for the noon meal provides the greatest share of the essential materials for the day. This fact is more readily appreciated if we glance at the supper meal.

"Supper" is served at sundown. The meal pattern is similar to that of tea (breakfast) in that its basic items are tea, bread, and butter or margarine. Because of the prevailing idea that a more substantial late afternoon meal disturbs restful sleeping, additional food items are infrequent, occurring as a practice only in homes of higher income or where there has been close association with the eating habits of Americans. Hence, the absence or insufficiency of colored vegetables and protein foods at the breakfast (noon meal) is likely to result in an inadequate consumption for the day.

With regard to colored foods, however, it is important to appreciate the contributions of yellow fruits to nutrition. Some fruits can well serve as the yellow food for the day. The mamey, mango, and the ripe yellow papaya are yellow fruits which swell the file of colored foods for table use. The use of uncultivated leaves in one-pot meals, such as *kalaloo* and *masamby*, represents a practical way of serving leafy green foods during periods of inadequate market supply. This practice also provides a saving in food cost, for the uncultivated plants may be gathered along the roadside and in the wastelands.

Ranking with the one-pot meals in popularity are two-dish menus that are equally entrenched in the island eating pattern. Boiled fish and fungi, souse and potato salad, fried fish and green bananas, or fried fish and plantains are community favorites. Such menus are indicative of the method of preparation.

It is noteworthy that the morning and supper beverages and cereals are the principal media of milk consumption which approximates $\frac{3}{4}$ to 1 cup a day. Milk is liked but economy limits its purchase. Legumes and fish are liberally used. There is a widespread preference for local fruits as between-meal snacks.

As would be expected, sea bathing is a principal form of island recreation. Beach parties and picnics fit in with such recreation and are frequently all-day affairs. At these gatherings a typical menu consists of a roast kid or goat; potato stuffing—a baked product of mashed potatoes, tomato sauce, raisins, and seasonings; red pea (kidney beans) or Navy baked beans; and coconut water (the water of the immature coconut). Other foods and drinks are used according to individual preferences.

The Virgin Islanders have several traditional holiday dishes. At Christmas, groups of singers and musicians go along the streets, and it is a custom of the home serenaded to serve refreshments. Guavaberry wine and sweet bread are traditional Christmas refreshments. The latter is similar to the American fruit cake. New Year's Day is the occasion for *kalaloo*. This dish is also served any time thereafter through Epiphany. Herring *gundi*, a popular lenten dish, is a salad of mashed pickled herring, salad oil, mashed potatoes, chopped beets, hot pepper, and lemon or lime juice. It is traditionally served on Good Friday.

New food processing and packaging methods are adding variety to the diet of G.I. Joe. Among new products are frozen cooked boneless turkey; small beef sausages; dehydated, precooked cream of onion, cream of potato, and Lima bean soups; concentrated tomato juice; experimental canned chocolate nut roll; and pearled wheat. This last item, not previously produced commercially in the United States, came into use because of the recent drain on supplies of rice and pearled barley for feeding prisoners of war and native employees of the Army in Korea.—*From: Activities Report, Food and Container Institute, 2nd quarter, 1953.*

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Book Reviews

Manual of Applied Nutrition. By Dietary Department, The Johns Hopkins Hospital (Janette C. Carlsen, ed.). Baltimore: The Johns Hopkins Press, 1952. Paper. Pp. 96. Price $2.50.

The third revision of this *Manual* should prove a useful addition to the very practical list of diet manuals prepared by some of the leading hospitals. In the new edition the table of contents is presented alphabetically. However, the book would be more convenient to use if there were a more detailed index. The number of special diets has been reduced, the principal change being the addition of information pertaining to cholesterol. The diabetic diet material is based upon the material developed by The American Dietetic Association, American Diabetes Association, and the Diabetes Branch, U. S. Public Health Service. The information on low caloric diets seems a little scanty and not in line with recent investigation. A more liberal use of fat would have been in order. A table of desirable weights for adults might well have been included. The reviewer wonders why the appropriate foreword from the second edition was omitted. The information in the book is concise, practical, well organized, and of a convenient size.—*Martha F. Trulson, D.Sc., Assistant Professor of Nutrition, Harvard School of Public Health, Boston.*

Infant Feeding and Feeding Difficulties. By Philip Rainsford Evans, M.D., F.R.C.P., and Ronald MacKeith, D.M., M.R.C.P., D.C.H. London: J. & A. Churchill Ltd., 1951. Cloth. Pp. 255. Price 12s 6d.

The purpose of this book was to present a simplified method of infant feeding. It was written for practicing physicians to help them understand the changes which have occurred in infant feeding practices during recent years. The presentation includes a wide variety of topics: standards of normal growth; the infant's digestive system; the anatomy and physiology of lactation; breast feeding; artificial feeding; and special problems such as prematurity, underfeeding and overfeeding, weaning difficulties, and so on. The methods described are those with which the authors have had experience. They state: "without sacrificing the detail which is often important, a dogmatic manner has been used for the sake of simplicity."

How well do the authors accomplish their objectives? Certainly the attempt to introduce a book which incorporates the new trends in infant feeding, i.e., a more permissive attitude, "more efficient ways of dealing with some of the problems of infant feeding and minor ailments," improvements in breast feeding—is commendable. The facts presented are accurate. All major problems of infant feeding are included. Self-regulated schedules are explained. However, the book seems to fall short of its objectives. For one thing, the style of writing detracts from the effectiveness of the book. A statement made positively without explanation of why it is made may result in simplicity, but many people will find it unacceptable. The skeptic will need to be convinced that a liberal method of infant feeding is more desirable; he doesn't simply accept it because someone says it is so. Second, while all major problems of infant feeding are included, some are discussed rather sketchily. This book left the reader with the impression that fewer selected topics, more completely outlined and presented in a more flexible manner would improve the usefulness of the book for more people.

This volume will probably be most helpful to the individual who wants information on many different aspects of infant feeding but who doesn't need detailed explanations of the views expressed.—*Lorraine Weng, Nutritionist, Department of Medicine, University of Illinois College of Medicine, Chicago.*

Good Home Cooking Across the U. S. A. By Nell B. Nichols. Ames, Iowa: The Iowa State College Press, 1952. Cloth Pp. 560. Price $3.95.

Nell Nichols, for many years on the editorial staff of the *Woman's Home Companion,* has here recorded tastes, opinions, stories, prejudices, and prides of cooks all over the United States. In her travels, she has questioned and interviewed, tasted, nibbled, sampled, and feasted on the finest achievements of many women and not a few men who are proud of their culinary talents.

Home economists read the various chapters and assisted in assembling this story of America's great dishes.

But this is not, strictly speaking, a "cook book." For the beginner it will be confusing. For the good cook, the food enthusiast, the dietitian, the "foods" teacher, and for any gourmet, however, *Good Home Cooking Across the U. S. A.* will be fascinating reading and a source of many new ideas and inspirations.—*Virginia Monahan Bayles, care of University of Kansas Medical Center, Kansas City, Kansas.*

The Complete Book of Home Freezing. By Hazel Meyer. Philadelphia: J. B. Lippincott Company, 1953. Cloth. Pp. 456. Price $4.95.

Anyone using or contemplating ownership of a freezer will appreciate this book. It is indeed *complete,* as indicated in the title. The author, in her work as a writer for advertising agencies, spent several years studying home freezers from the designer's blueprint to the latest finding in home economics research. In addition, she takes freezing seriously in her home. Her practical experience is obvious in her hints and helpful comments throughout the book.

Chapters are devoted to the following: buying the right freezer for your needs, care of your freezer, the value and importance of correct freezing, packaging materials and methods, meats (general information is given and followed by individual chapters on beef, veal, lamb, pork and ham, variety meats, poultry, and fish). Wild game enthusiasts will appreciate the chapter on that subject—including the various state game laws relating to freezing. Chapters follow which give information on freezing of dairy foods, vegetables, and fruits (with separate chapters for berries and melons).

Emphasis then changes to the use of frozen foods—cooking and thawing—and to the preparation of bakery goods. Particularly interesting is the chapter on "Recipes for the Freezer." The recipes are given in fairly large quantities and are from the author's own kitchen. Foreign recipes are included, too. To conclude the book, miscellaneous suggestions for uses of the freezer, including ice cube tricks, holiday preparations, and lunchbox lunches are given.

Perhaps the greatest value of this book lies in the information which goes beyond the general types found in the usual freezer instruction book. The informal, yet informative style of the author makes the reader feel at ease with the subject and gives her the inspiration to put her freezer to the greatest possible use.—*Margene A. Wagstaff, Warrenville, Illinois.*

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Current Literature

Contributed by Mildred Bonnell and administrative dietetic interns, University of Washington, Seattle; Janette C. Carlsen and Ethel M. Miller, The Johns Hopkins Hospital, Baltimore; Elizabeth H. Tuft, Wesley Memorial Hospital, Chicago; and the Journal staff

THE AMERICAN JOURNAL OF DIGESTIVE DISEASES

Vol. 20, June, 1953

* Iron equilibrium. Clinical observations on nutritional anemia. A. C. Johnson.—p. 179.

Iron Equilibrium. One of the basic considerations in iron deficiency anemia is supplying adequate iron and protein. The diet should provide all of the nutritional materials simultaneously, and iron supplementation should be planned on the premise that the food will provide some of the iron needed. It would be impossible to meet the iron need in anemia by food alone because of the limits of the intestinal tract. Supplementary elemental iron should be offered either in the presence of ascorbic or some other acid. It should not be given in the presence of a high phosphorus content of diet or medications. If calcium or other alkaline materials must be given, they should be administered separately from the supplemental ferrous or ferric compounds. A low-phosphorus diet has been found to produce larger iron stores, and excess calcium inhibits iron assimilation.

THE AMERICAN JOURNAL OF MEDICINE

Vol. 14, June, 1953

* Effect of weight reduction and caloric balance on serum lipoprotein and cholesterol levels. W. J. Walker, E. Y. Lawry, D. E. Love, G. V. Mann, S. A. Levine, and F. J. Stare.—p. 654.

Caloric Balance and Serum Lipids. This study has demonstrated that in many individuals serum lipoprotein levels are sensitive to the status of caloric balance. The serum lipids tended to fall during negative caloric balance and to rise when it was positive. The degree and permanency of this reduction can be related to the initial level of serum lipids. The reduction was more consistent in subjects when initial lipoprotein levels were 50 mg. per 100 ml. or more, and was greater during weight loss. In subjects with lower initial levels no reduction, a reduction followed by a rebound, or even an increase of serum lipids was observed with weight loss. The degree of initial obesity was not a determining factor in the serum lipid changes and the rate of weight loss seemed only slightly concerned. Caloric balance, rather than level of lipid intake, appeared to play a major role in controlling these serum lipid levels. On a low-fat diet, the cholesterol intake had no demonstrable influence on the serum lipids. The correlation between obesity and serum lipoprotein levels, coupled with this demonstration that weight reduction will often lower these serum lipoproteins, suggests that in our present state of knowledge the prevention and correction of obesity is the most plausible treatment of atherosclerosis.

THE AMERICAN JOURNAL OF NURSING

Vol. 53, July, 1953

* Nurses, patients, and therapeutic diets. R. E. Sperry.—p. 850.

Teaching Home Diets. Nurses must be familiar with all the material about their patients' discharge diets, even if a formal teaching plan is not in use. After ascertaining what the patient needs to know and understand, the nurse should instruct in words within his grasp, remembering the laws of learning. Emotional, cultural, and socioeconomic factors should also be considered in planning the individual's diet. Discussion of good nutrition in general should begin the instruction, with emphasis on the foods permitted rather than those restricted. Even if the dietitian explains basic principles to the patient, the nurse still is responsible for reiterating the importance of diet in the control of the disease. Student nurses, rather than being relegated to food jobs suitable for maids or aides, should be allowed to observe expert patient instruction. Ideally, they should help plan and calculate typical diets, see them served, and visit the patients with the dietitian. Later, they should have practice in instructing patients under the dietitian's or the head nurse's guidance.

AMERICAN JOURNAL OF PUBLIC HEALTH

Vol. 43, June, 1953, Part I

* An appraisal of the water-borne fluoride-dental caries relationship. F. S. McKay.—p. 700.
* Some reflections on the epidemiology of fluorine and dental health. H. T. Dean.—p. 704.

Fluoride and Dental Caries. The history of water fluoridation is traced, and objections to fluoridation as ineffective or pathogenic are met. It has been found that a fluoride content of approximately 1.0 p.p.m. is the ideal concentration for producing a marked decrease in dental caries without, at the same time, causing "mottled enamel" (visible fluorosis). Caries statistics from communities with natural or induced fluoridation are compared with those of communities without fluoridation.

Fluorine and Dental Health. The author describes epidemiology as a heterogeneous discipline and, in particular, discusses the epidemiology of fluorine and dental health. Examples of field survey and field review results are given. Fluoridation research is continuing under the stimulus of healthy controversy.

ARCHIVES OF INTERNAL MEDICINE

Vol. 91, June, 1953

* Insulin reactions. Manifestations and need for recognition of long-acting insulin reactions R. K. Maddock and L. P. Krall.—p. 695.
* Tolerance to nasogastric tube feedings. A comparative clinical study of two dietary formulas. E. B. Smith, E. E. Wollaeger, and Sister M. Victor.—p. 721.

Insulin Reactions. Fast-acting crystalline insulin causes an "adrenalin-like" reaction with a rapid drop in blood sugar level and a resulting increase in circulating epinephrine. The reaction is characterized by the classic hypoglycemic symptoms of sweating, hunger, tremor, and palpitation, and is easily recognized by the patient and by trained observers. Slower-acting insulins cause more gradual falls in blood sugar levels and a "central nervous system type" of reaction. The symptoms are characterized by changes in mood, personality, judgment, and behavior as well as the more mundane signs, such as headache and nausea, or the more serious central nervous system symptoms culminating in convulsions and coma. This type of reaction is frequently undetected by the patient as well as his associates. It is vitally important to detect mild early changes in mood, temperament, judgment, or behavior in a patient receiving long-acting insulin, because even though he denies the existence of a reaction, he may be in the early stages of a most dangerous type of hypoglycemic reaction.

Nasogastric Tube Feedings. A controlled study is reported of the effect of two tube feedings on the incidence of diarrhea. Of 44 patients receiving a formula high in protein and carbohydrate and low in fat, 39 per cent developed diarrhea. In contrast, only 10 per cent of 30 patients on a second formula, of equal volume and caloric value but which contained carbohydrate, protein, and fat in proportions closely resembling those of a normal diet, developed diarrhea. Also, 10 of the 12 patients who took both feeding mixtures experienced diarrhea only when taking Formula 1. The other two were intolerant to both formulas. The qualities of the first formula which might account for the poor tolerance either

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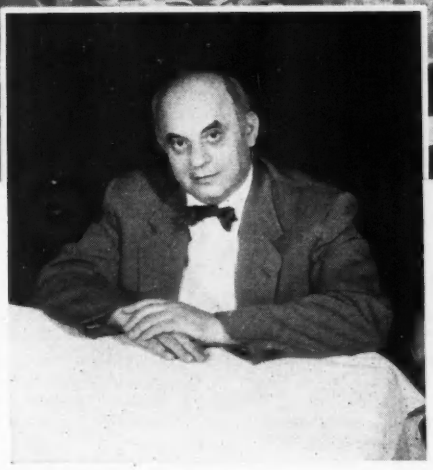

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alone or in combination were: (a) its high carbohydrate and protein content; (b) the nature of its high protein and carbohydrate content (largely derived from milk); and (c) its unbalanced composition in respect to the three major foodstuffs.

ARCHIVES OF PEDIATRICS

Vol. 70, May, 1953

* The excretion of methionine in children in health and disease. A. S. Abbasy and E. A. Eisa.—p. 146.

Methionine Excretion in Children. The role and importance of methionine in the protection and nutrition of the liver parenchyma are discussed, and the biochemistry and mode of action of methionine are described. The 24-hr. urine of sixty-seven normal children and thirty adolescents and adults of both sexes was collected and analyzed for methionine. Results indicated that methionine elimination was directly related to age; the younger the child, the less methionine was excreted. Tolerance tests showed similar results. Forty diseased children were also observed. Those who were suffering from hepatitis with jaundice, acute pneumonia, or mild tuberculosis showed a urinary methionine excretion which was far above normal. As liver function improved, excretion returned to a normal range, and protein depletion gradually ceased. Patients with hepatomegaly, acute and subacute nephritis, and subacute endocarditis, however, maintained apparently normal excretion levels throughout the course of the disease.

DIABETES

Vol. 2, May-June, 1953

* Serum cholesterol in juvenile diabetes. M. S. Dine and R. L. Jackson.—p. 206.

Serum Cholesterol in Juvenile Diabetes. In an effort to examine the interrelationship of degree of diabetic control, level of serum lipids, and vascular degeneration, an analysis of serum cholesterol values was undertaken. Serial serum cholesterol values were obtained in forty-eight cases of diabetes mellitus of recent onset among children ranging from four months to fifteen years of age. These values were analyzed in terms of their relationship to changes in the degree of control of the disease. The initial serum cholesterol values varied from 100 to 1220 mg. per 100 ml. The age, sex, diet prior to admission, duration of symptoms, presence or absence of acidosis or ketosis, the degree of malnutrition, or the insulin requirement failed to explain the wide variations. In forty-four normal children, the mean serum cholesterol was 204; the standard deviation, 34 mg. per 100 ml. After the period of initial regulation, the level of serum cholesterol in the children with diabetes appeared to change with the degree of control, not as an immediate response but as a result of weeks or months of a given degree of control. Almost all patients who maintained excellent or good control had a relatively constant serum cholesterol level within the normal range. Patients who achieved only fair to poor control usually continued to show marked fluctuations on serum cholesterol values.

JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

Vol. 1, May 27, 1953

* Improved public health through better nutrition. W. H. Sebrell, Jr.—p. 364.
* Flavor of selected vegetables grown in soil treated with isomers of benzene hexachloride. E. H. Dawson, G. L. Gilpin, M. E. Kirkpatrick, and C. A. Weigel.—p. 399.

Vol. 1, June 24, 1953

* Aureomycin-vitamin B_{12}. Influence on growth, moisture, fat, and nitrogen content. L. Mirone.—p. 519.

Better Nutrition and Public Health. The author acknowledges the advances in nutrition research which have contributed to improved public health and indicates areas, such as nutritional requirements of the aged, the problem of obesity, and proper nutrition under conditions of stress, which require further research. The progress of investigations into the effect of dietary manipulations on chronic diseases, on borderline deficiencies, and on growth is also reviewed. Increases in general life expectancy emphasize the importance of continued research along these lines.

Flavor and Soil Treatment. Because flavor of some vegetables seems to be affected when benzene hexachloride is used in the soil as an insecticide, a study was made to learn the role of each of its four isomers in causing the objectionable flavor or odor. Tomatoes, Lima beans, potatoes, radishes, and carrots were used. The four individual isomers of benzene hexachloride, a mixture of the four, and commercial gamma isomer (lindane) were tested. A taste panel, carefully selected on the basis of threshold tests, rated the vegetables according to the off-flavors. The results indicate that certain formulations of benzene hexachloride affect flavor, the effect varying with the formulation, the dosage rate in the soil, and the type of vegetable. Tomatoes were most adversely disflavored by the isomer mixture; Lima beans, by the delta isomer but also by the isomer mixture and lindane; potatoes, by the mixture, lindane, alpha isomer, and gamma. Off-flavors were most often detected in radishes grown under 4-lb.-per-acre dosages of lindane. Raw carrots were generally acceptable, but 4-lb.-per-acre dosages of lindane were detected in cooked carrots.

Aureomycin and Vitamin B_{12}. The effect of different levels of aureomycin with and without vitamin B_{12} on growth and on the chemical composition of dba mice was studied. The dietary and analytical methods of the investigation are described. Aureomycin hydrochloride with and without vitamin B_{12} had varying effects on growth, body moisture, fat, and nitrogen content depending: (a) on the quality of the accompanying diet; or (b) on the sex of the animal. Aureomycin, with and without vitamin B_{12}, and vitamin B_{12} alone had no beneficial effect on the growth rate of the female mice. Aureomycin also had no effect on the growth of the males, although the addition of vitamin B_{12} to their diet resulted in a growth response during the first five weeks, but not uniformly throughout ten weeks. Further work may also indicate a distinct advantage in the simultaneous administration of B_{12} and aureomycin in treating debilitating disease and in cases of extreme emaciation resulting from starvation or inadequate nutrition.

JOURNAL OF THE AMERICAN GERIATRICS SOCIETY

Vol. 1, April, 1953

* The pathogenesis and treatment of hypertension. A. Grollman.—p. 223.

Regulation of fluid and electrolyte balance in aged persons. J. H. Bland.—p. 233.

Hypertension. The author defines the often misused term "hypertension" as applying to a specific disease characterized hemodynamically by a rise in blood pressure secondary to an increased peripheral resistance, with a normal cardiac output; clinically, by a widely varying rate of progression; and pathologically, by specific changes in the blood vessels, heart, and other tissues. Experimental data to support the renal origin of hypertension are offered, the pathogenesis of renal hypertension is described, and the relation of arteriolarsclerosis to hypertension is discussed. The following well-established measures for reducing blood pressure are given: reassuranee and other psychotherapeutic procedures, the use of sedatives, rest, reduction in weight, and the development of a congenial "doctor-patient" relationship. Drug therapy, except in the case of hypertension crises, is discouraged. The restriction of sodium is the only dietary procedure of any demonstrated value in reducing blood pressure; the rationale for such procedure is apparently based on the demonstrated deviations of the sodium-water metabolism. From a theoretical viewpoint, the use of renal extracts as a form of substitution therapy would appear to be the logical approach to rational therapeutics, if one accepts the renal origin of hypertension as described in the article.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Vol. 152, May 30, 1953

* *p*H of saliva and tooth decay. Queries and Minor Notes.—p. 483.

***p*H of Saliva and Tooth Decay.** There is no known treatment that will raise the *p*H of the saliva. The hydrogen ion concentration of the saliva varies directly with the carbon dioxide content of the blood; conditions associated with the retention of carbon dioxide in the blood cause increased excretion of the gas in the saliva and increase its acidity. Several investigators have been unable to show any relationship between the reaction of saliva and the incidence of dental caries. Decalcification and decay can be eliminated and their incidence reduced by proper restorative dentistry, and, when indicated, by dietary restriction of carbohydrates.

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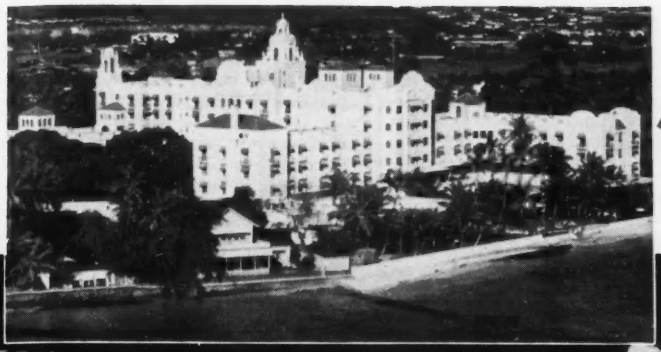

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THE JOURNAL OF CLINICAL INVESTIGATION

Vol. 32, June, 1953

* Studies in phosphorus metabolism in man. III. The distribution, exchange and excretion of phosphorus in man using radioactive phosphorus (P^{32}) as a tracer. S. M. Levenson, M. A. Adams, H. Rosen, and F. H. L. Taylor.—p. 497.

Phosphorus Metabolism. Distribution of radiophosphorus has been studied in various plasma, red cell, and urine fractions of normal young men following the rapid intravenous administration of labeled phosphates. The subjects were on normal intakes prior to the study. Observations were made after a 12-hr. fast. Most of labeled phosphate left the blood within a few minutes after injection, indicating a very rapid transcapillary movement of phosphate. Following this initial rapid decrease in plasma radioactivity, its disappearance slowed, perhaps representing entrance of phosphate into cells. Glucose (25 gm.) administered intravenously 1 hr. after phosphorus injection accelerated the movement of phosphorus out of the plasma by a factor of 3, while intravenous insulin accelerated it by a factor of 4. The average body "constants"—the rapidly exchangeable body phosphorus pool (about 1.2 gm.) and the rate at which phosphorus leaves this pool (about 8.5 mg. per minute)—were calculated. These data suggest that the rapidly exchangeable body phosphorus turns over approximately ten times per day under the conditions of this study. There was a gradual shift of the labeled phosphorus from the inorganic to the organic fraction so that 120 hr. after injection, about 30 per cent was present as organic phosphorus, chiefly as acid-soluble compounds.

JOURNAL OF HOME ECONOMICS

Vol. 45, June, 1953

* Trends in adult education. I. Patterson.—p. 383.
* Food habits of Iowa children—breakfast. D. Sidwell and E. S. Eppright.—p. 401.

Adult Education. Factors influencing adults to seek education in homemaking, and six trends designed to meet the needs of adult education are presented. These trends are: (a) teaching the whole family; (b) considering the role of the family in modern society; (c) recognizing the different stages in the family cycle and what a person can be taught at each stage; (d) applying modern concepts of learning; (e) teaching in many different ways; and (f) preparing leaders to teach adults.

Children's Breakfasts. Reported in this article is a study of the breakfast habits of Iowa children. The breakfasts usually contained bread and cereals, with their accompaniments. Milk was used in inadequate amounts by both sexes and all ages. Eggs and meat were not regularly eaten, and the breakfasts included little fruit. From half to two-thirds of the breakfasts were classified as "poor." Rural children drank less milk than city and town children, and the breakfasts of the girls, particularly in regard to the use of milk and eggs, apparently became worse as they became older. The need for teaching children the importance of breakfast is stressed.

THE JOURNAL OF NUTRITION

Vol. 50, May, 1953

* Comparison of chemical analysis and bioassay as measures of vitamin A value: yellow corn meal. E. C. Callison, L. F. Hallman, W. F. Martin, and E. Orent-Keiles.—p. 85.
* The effect of terramycin on the growth and body composition of pigs. T.-C. Huang and C. M. McCay.—p. 129.
* The effect of dietary amino acid levels upon the oxidation of L- and D-amino acids by kidney tissue. A. L. Sheffner and O. Bergeim.—p. 141.

Vol. 50, June, 1953

* Effects of vitamin B_{12} on the utilization of carotene and vitamin A by the rat. E. G. High and S. S. Wilson.—p. 203.
* The disappearance of radioactivity from the tissues of rats of different ages after subcutaneous administration of radiovitamin B_{12}. C. A. Lang, D. M. Gleysteen, and B. F. Chow.—p. 213.
* Nutritional intake of children. I. Calories, carbohydrate, fat and protein. V. A. Beal.—p. 223.
* Difference in the caries-producing effects of two purified diets containing the same amount of sugar. W. Wynn, J. Haldi, J. H. Shaw, and R. F. Sognnaes.—p. 267.

Vitamin A in Yellow Corn Meal. The provitamin A carotenoids of yellow, water-ground corn meal were separated by chromatographic techniques and measured spectrophotometrically. The vitamin A values of the corn meal and of its carotenoid extract were then determined by rat growth bioassay, and the availability of the carotene was calculated. The bioassay vitamin A value of the corn meal extract, 324 I.U. per 100 gm. meal, agreed with the vitamin A potency calculated from chemical analysis, 317 I.U. The biologically active carotenes, as they occur in corn meal, proved to have a biologic vitamin A value of 264 I.U. per 100 gm. and were 82 per cent available to the rat. It is suggested that the poor availability reported by other investigators may be accounted for by the inclusion of considerable amounts of inactive pigments with the β-carotene fraction.

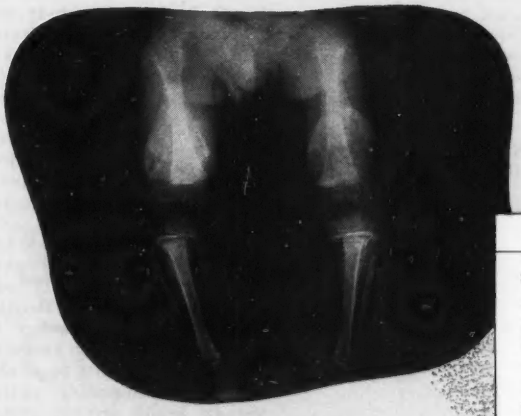
Terramycin and Swine Growth. Terramycin stimulated the growth of pigs fed a corn-soybean basal ration. This antibiotic improved the digestibility, especially of dry matter and protein, at an early age. When slaughtered at the same market weight (approximately 80 kg.), the pigs which had received terramycin had a higher dressing percentage than the controls. In gross analysis, the pigs fed terramycin yielded more total fat and lean meat by weight, but a lower percentage of lean meat and a higher percentage of fat than the controls. With the exception of vitamin A content, which was higher in the livers of terramycin-fed pigs, there was no other significant difference in composition of the internal organs or other meat samples. In biologic assay studies, terramycin residues in meat, if any, produced no growth effect in rats. However, supplemental terramycin stimulated the growth of rats fed pork, indicating that the antibiotic improved utilization of the pork protein.

Amino Acid Oxidation. Various dietary factors have been found to influence the activity of D-amino acid oxidase, an enzyme whose apparent substrate has never been found in normal mammalian tissues. Therefore, a study was made of the effects of increasing the ingestion of single amino acids on the oxidation of L-amino acids in kidney tissue. The enzymatic activity of rat kidney tissue was observed, and two series of experiments with living rats were conducted. It was found that increased postprandial tissue levels of single D-amino acids did not result in increased enzyme activity when the animal was maintained on an adequate diet. However, the addition of DL-methionine or more casein to an inadequate protein diet did cause an increase in the rate of D-amino acid oxidation by the kidney.

Vitamin B_{12}, Carotene, and Vitamin A. An investigation has been made of the effects of vitamin B_{12} on the storage of vitamin A from carotene and preformed vitamin A. Young albino rats deficient in both vitamins were supplemented daily for twenty-one days with moderate amounts of either carotene or vitamin A dissolved in cottonseed oil. Intramuscular injection of vitamin B_{12}, with and without sulfasuxidine in the diet, was found to increase both growth and the deposition of vitamin A from ingested carotene. Deposition was greater with sulfasuxidine. An APF supplement was likewise effective in increasing the utilization of carotene for the storage of vitamin A in the liver. On the other hand, vitamin B_{12} was comparatively ineffective in the utilization of preformed vitamin A for storage, although it increased growth. These results suggest that the concomitant administration of vitamin B_{12} and carotene, and perhaps vitamin A, may produce beneficial effects in regard to the vitamin A needs of animals.

Renal Retention of Vitamin B_{12}. Tagged vitamin B_{12} was injected subcutaneously at four different levels into male rats two to three months old and fourteen to eighteen months old, to learn the relationship of age to the retention of B_{12}. The radioactivity in urine specimens collected 24 to 48 hr. after injection, and in the kidneys and livers of animals sacrificed two to fourteen days after injection, was determined. At a given level of injection, the activity in urine samples or in these organs was the same in both age groups. The exception was that, fourteen days after injection, the kidneys of "old" rats had greater activity than did those of "young" rats. This was not true two days after injection. The authors suggest that the greater radioactivity in the kidneys of old rats after two weeks was due to a slower rate of disappearance rather than greater amounts initially retained. This may be accounted for on a physiologic basis or by the existence of chemical substances capable of binding B_{12}.

Nutritional Intake of Children. The data from 604 nutrition histories on 46 healthy children are analyzed. The children were all under five years of age and came from "upper middle class"



AGE	NO. SUBJECTS EXAMINED	NO. WITH SCURVY	% WITH SCURVY	NO. WHITE SUBJECTS	NO. WITH SCURVY	NO. NEGRO SUBJECTS	NO. WITH SCURVY
0–[illegible]	360	0	0	174	0	186	0
10–20 da.	90	1	—	41	1	49	0
1 [illegible]	99	0	0	48	0	51	0
2 mo.	90	2	2.2	34	2	56	0
3 mo.	69	3	4.3	31	3	38	0
4 mo.	79	2	2.5	26	1	53	1
5 mo.	73	12	16.5	25	3	48	9
6 mo.	53	13	24.5	19	5	34	8
7 mo.	54	10	18.5	22	7	32	3
8 mo.	40	5	12.5	18	2	22	3
9 mo.	38	10	26.3	12	4	26	6
10 mo.	41	5	12.2	16	0	25	5
11 mo.	40	3	7.5	12	0	28	3
12–23 mo.	177	3	—	68	1	109	2
Total.....	1303	69		546	29	757	40

PREVALENCE OF SCURVY

SCURVY

is more common than many think

Histological examination* of bone structure in 1300 infant post mortems revealed that scurvy occurred more than 10 times as frequently as is usually shown by clinical diagnosis. The most susceptible age is from the fifth through the eleventh month, with approximately 17% of infants exhibiting the histological signs. Over half of the children with scurvy had never received supplemental vitamin C. How easy to prevent, when Florida citrus is so rich in vitamin C content — so convenient, so economical, and so pleasant to take!

* *Bull. Johns Hopkins Hosp. 87:569, 1950.*

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families of the Denver area. The group showed increases in total intakes of calories, carbohydrate, and fat from birth to five years. The intake of protein, however, reached a plateau between eighteen months and three years, reflecting the capricious eating habits of the preschool child. The lag in appetite of the preschool child was indicated by marked decrease in the consumption of milk and vegetables. The age of onset of poor appetite varied, most often being between nine and eighteen months; duration ranged from a few months to more than two years. To date, none of the children has failed to exhibit this reaction to food. A sex difference was also indicated. Protein intake per kilogram of body weight showed a consistent decrease over this age period. The median caloric intake was close to the Recommended Dietary Allowance, whereas the median protein intake exceeded it in the first two years and was similar to it thereafter.

Cariogenicity of High-Sugar Diets. Litter-mates of both albino and cotton rats were fed two synthetic diets which differed quantitatively in a considerable number of constituents, but were identical in sugar content. After eighty days, the teeth of the animals were examined for carious lesions. Since one diet proved much more cariogenic than the other, despite identical sugar contents, it would seem that other dietary factors were responsible, at least in part, for the incidence of caries. Further experiments are being conducted to determine what these factors are and how they operate.

THE LANCET

No. 6773, June 20, 1953

What is ulcerative colitis? B. N. Brooke.—p. 1220.

NEW ENGLAND JOURNAL OF MEDICINE

Vol. 248, June 4, 1953

Symposium on obesity.

Reorientation on obesity. A. W. Pennington.—p. 959.

Lipogenesis. S. Gurin.—p. 965.

Health and obesity. D. P. Barr.—p. 967.

Relation of obesity to longevity. L. I. Dublin.—p. 971.

The psychology of overeating. H. W. Brosin.—p. 974.

NURSING OUTLOOK

Vol. 1, June, 1953

* New methods of changing old food habits. B. Holman and H. Sybalsky.—p. 346.

Parties Change Food Habits. "Cooking party" invitations came to key members of Puerto Rican immigrant families under the care of the Community Service Society of New York. This was a cooperative project of the public health nurses and the nutrition consultant with the group, in which cooking demonstrations were considered a part of the continuing service of health guidance. Menus were geared to Puerto Rican taste and printed in Spanish, and new or seldom-used nutritious foods were combined with familiar favorites. Guests helped cook the meals, asked questions, and joined discussions of such food-related subjects as economy, sanitation, efficiency, and children's emotions. Tropical disease had ravaged the group's iron supply; therefore, the aim of the first demonstration was to persuade families to use more iron-rich foods. Later parties featured balanced meals, with special stress on citrus fruits and leafy green vegetables for vitamin A and ascorbic acid. Nurses, who did the follow-up in homes, reported that while the demonstrations could not be put on a research basis with a control group, more than 90 per cent of the parents were making use of what they had learned.

NUTRITION ABSTRACTS AND REVIEWS

Vol. 23, April, 1953

* FAO. W. R. Aykroyd.—p. 229.

FAO. The author traces the history of the Food and Agriculture Organization of the United Nations (FAO) from its founding in 1945, through its development and its achievements. The various functions and committees of the organization are described.

NUTRITION REVIEWS

Vol. 11, May, 1953

* Nutrition in clinical medicine. A. Grollman.—p. 129.
* Body composition in health and disease.—p. 137.
* Obesity, weight reduction and longevity.—p. 144.

Vol. 11, June, 1953

* The challenge of nutrition in state health department activities. J. H. Brown.—p. 161.
* The water requirement of infants fed concentrated formulas.—p. 169.
* Low fat diet in treatment of multiple sclerosis.—p. 171.
* Growth stimulation by coconut milk.—p. 180.
* Cortisone and protein synthesis.—p. 184.
* Thiamine-sparing effect of fat.—p. 188.

Nutrition in Clinical Medicine. Some of the areas in which nutritional measures may serve to prevent or control disease are reviewed. The author mentions recent developments in research on the roles of caloric intake, the vitamins, electrolytes and water, cholesterol, and rare elements such as iodine and fluorine. The application of nutritional knowledge can, in many cases, prove life-saving; in others, it may markedly shorten the period of disability.

Body Composition. The deuterium oxide method of measuring body water is evaluated, and the results of several studies on body composition are discussed. The amount of body water appears to differ according to age, physical type, and sex. It was lower in younger individuals, obese individuals, and women, indicating that total body water is inversely related to total body fat. Changes in body composition result from loss or gain of whole tissue, of fat, of water, of lean tissue, or of various combinations of these. People with a variety of illnesses or injuries were found to undergo rapid changes in body composition because of acute disturbance in water balance. Excessive assimilation of water was more common than dehydration. In those whose weight loss had been excessive, lean tissue appeared to be gained before the fat tissue, and a concomitant decrease in extracellular water ensued. Further studies in the body composition of healthy and ill individuals are needed to establish statistically significant values.

Weight Reduction and Longevity. Obesity, according to the results of a recent insurance company survey of its policy holders, is a subtle but serious health hazard. The study showed that obesity appears to constitute a greater health hazard when it occurs in younger individuals; however, in men and women of all ages, the mortality rate is directly related to the degree of obesity above the appropriate average weight. Overweight individuals are subject to high death rates from degenerative diseases of the heart, arteries, and kidneys, and from gallstones, appendicitis, and cirrhosis. Mortality was observed to decrease among previously overweight individuals who had subsequently reduced.

Nutrition in State Health Departments. The wider use of nutritional knowledge should be a part of every state health department medical program. Plans for integrating nutrition with various health services should be laid by department administrators and carried out under the guidance of a nutritionist, by the professional personnel who direct each program. This basic core of activity will offer further avenues of service in areas such as social welfare and public information services, and in this way will disseminate the benefits of nutritional knowledge to the widespread betterment of public health.

Infant Water Requirements. Because of the relatively poor ability of the immature kidney to concentrate urine, an adequate water intake is an important part of infant feeding. When dilute evaporated milk or whole milk formulas include additional carbohydrates, the proper caloric concentration of 0.67 calories per milliliter is maintained; unmodified cow's milk, however, imposes an added solute load on the kidney. Six premature infants were fed modified and unmodified hypercaloric formulas, and urine specimens were analyzed for osmolarity and the daily renal load. The unmodified evaporated milk formula imposed a solute load which, expressed in terms of renal water requirement, almost approached basic water needs. Such a situation leaves no marginal excess for extrarenal water loss. The use of dilute evaporated milk mixtures incorporating added carbohydrate to make them isocaloric with human milk provides adequate nourishment without adding to the water-consuming renal solute load.

Low-Fat Diet for Multiple Sclerosis. Since previous epidemiologic studies indicated a high occurrence of multiple sclerosis among peoples of high fat consumption, the effect of fat restriction on the course of the established disease is being studied. Forty-seven patients have been provided with a diet which allows 40 gm. fat daily and provides 50 gm. protein or more, as well as vitamin supplements and carbohydrate sufficient for the individual. Results are evaluated

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by comparing the course of the disease before and after the institution of the low-fat diet. In early cases of the disease, exacerbations had occurred at average intervals of ten months during the pretreatment period. These periods of disease activation have not been eliminated, but the mean interval between attacks has been increased to forty-two months, and the attacks are shorter and less severe. Similar results have been observed in the advanced cases. It would appear that a low-fat diet, although not curative, offers clinical improvement in multiple sclerosis. Several explanations are given of the role of fat. The over-ready acceptance of the results of the experiment is discouraged until further investigations have been conducted.

Growth Stimulation by Coconut Milk. In order to identify the growth-promoting substance of coconut milk which had been observed previously, fractionation of the milk was undertaken. At least three closely related substances of unknown identity, although there may be more, were recognized as chemical entities which produced growth. The fractionation process is described. The active fractions, Compounds A, B, and C, were isolated in crystalline form; combined with hydrolyzed casein, they were found to stimulate growth of the phloem cells in carrots equal to that stimulated by the original coconut milk. Coconut milk has been shown to stimulate the growth of fungi, bacteria, and orchids as well as the cells in carrot and beet; in view of the striking potency of this endosperm structure, further investigation of its composition is warranted.

Cortisone and Protein Synthesis. An experiment was conducted to determine whether the augmented loss of nitrogen in the urine after the administration of cortisone arises from an inhibition of protein synthesis or from an exaggeration of protein breakdown. Normal and adrenalectomized rats were studied with both the aid of ingested labeled glycine and injection of adrenal cortical steroids having substitution groups at the 11-position. The hormone-treated rats lost weight despite the same food intake as that of the controls, thus indicating an interference with protein metabolism. Results suggest that, physiologically, cortisone causes loss of nitrogen in the urine through interference with protein synthesis from possible nonprotein dietary precursors. Tissue and liver studies revealed that cortisone delays protein synthesis on the tissues. On the other hand, the livers of the experimental animals contained more protein. It is suggested that the delay in protein synthesis in the tissues forces the liver to compensate. However, the comparative mass of hepatic tissue is so small that the over-all picture in the body is one of inhibition of protein synthesis by cortisone.

Thiamine-Sparing Effect of Fat. It has long been known that a high-carbohydrate diet brings on symptoms of thiamine deficiency faster than a high-fat diet. This action might be due either to an increased carbohydrate intake entailing greater loss of thiamine from the tissues or to symptoms appearing at concentrations of thiamine in tissues at which they would not be evident if a high-fat diet were consumed. Earlier work with pigeons established that increased carbohydrate leads to increased disappearance of thiamine in the tissues. More recent work has shown that on a high-carbohydrate diet, thiamine in heart and liver tissues of pigeons was significantly lower and in breast muscle and cerebrum significantly higher than on a high-fat diet. It, therefore, appears established that the sparing action of fat really means decreased destruction of the vitamin on a high-fat diet.

PUBLIC HEALTH REPORTS

Vol. 68, June, 1953

* The interest of public health in diabetes. M. J. Ford.—p. 624.

Public Health and Diabetes. Diabetes, already one of the major public health problems, is rapidly increasing; since its occurrence is more prevalent among older people, it can be expected to increase progressively as the older population grows. The author stresses the need for public health organizations to conduct programs in the interest of detecting unknown diabetes, of educating the public in the meaning and treatment of the disease, and in helping doctors to educate patients in adapting their lives to it. The successful establishment of such programs in several states is described, and suggestions for starting them are given.

QUARTERLY BULLETIN OF NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

Vol. 27, Summer, 1953

* The roles of emotional stress and diet in the etiology of diabetes mellitus. N. M. Simon and S. Mirsky.—p. 126.

Stress and Diet in Diabetes. The effects of emotional stress, in the form of anxiety induced by electric shock, and of a high-fat diet on blood glucose were studied in the albino rat. Forty male rats were used in four groups as follows: Group I (control)—normal diet, no stress; Group II (experimental)—normal diet, stress; Group III (control)—high-fat diet, no stress; Group IV (experimental)—high-fat diet, stress. It was found that neither stress nor diet alone was capable of producing significant change in blood sugar, but, together, they were able to bring about a significant elevation of blood glucose (from 113 to 138 mg. per 100 c.c. following temporary downward fluctuations). There was, however, no evidence of clinical diabetes. Most of the hyperglycemic effect was attributed to diet rather than stress. The high-fat diet alone led to an increase in the amount of islet tissue and a reduction in the insulin content of the pancreas. However, these changes would, in all likelihood, not be of sufficient magnitude to cause a significant and permanent hyperglycemia. It may be conjectured, therefore, that the role of emotional stress in the etiology of diabetes mellitus is probably that of a triggering mechanism which may set off the chain of pathologic reactions only in individuals predisposed by virtue of some factor, such as diet.

SCIENCE

Vol. 117, May 15, 1953

* Excessive intake of vitamin A as a cause of congenital anomalies in the rat. S. Q. Cohlan.—p. 535.

Vol. 117, June 5, 1953

* Caloric intake in relation to physique in children. P. S. Peckos.—p. 631.

Excessive Intake of Vitamin A. Pregnant rats of the same strain were fed 35,000 I.U. vitamin A daily from the second to the sixteenth day of gestation. The excessive vitamin A was found to produce a diminished litter rate, as compared with that of control rats on normal diets and mated under the same conditions, and a marked incidence of gross congenital defects. The defect apparent in each of the abnormal offspring rats was an extrusion of the brain to the external surface of the head. Sporadic anomalies noted were macroglossia, harelip, cleft palate, and gross defects in eye development.

Caloric Intake and the Child Physique. The dietary data of 86 children—28 endomorphs (obese), 21 mesomorphs (muscular), and 37 ectomorphs (skinny)—were studied to determine whether there is a difference in caloric intake in children of different physiques. The children ranged from six to fourteen years of age and were of both sexes; none gave evidence of pathosis. The caloric intake for a week, as recorded by the mothers, was found to be, for each group, in the opposite direction from the expected pattern. Obese children showed a mean caloric intake of 87.6 per cent of the National Research Council allowances, whereas linear or "skinny" children consumed 103.5 per cent. The operation of the following determining factors is suggested: (a) inherent, genetically determined differences in food utilization and tendency to deposition of fat; (b) different activity rates, including resting activity and involuntary motion; and (c) differences in heat loss relative to body mass, with heat conservation most efficient in individuals with lowest ratio of mass to surface area. Although there is other evidence that, on an individual basis, obesity may be due to overeating, on a group basis this is an insufficient explanation. These results intensify the problem of weight control. It would appear that an obese child's caloric intake must be decreased to 1200 to 1500 calories daily to insure weight loss; this, however, would not supply recommendations for other nutrients needed for growth and development.

SOUTH AFRICAN JOURNAL OF CLINICAL SCIENCE

Vol. 4, March, 1953

* Puberty in South African girls: I. The menarche in Indian girls of Durban. E. Kark.—p. 23.

Nutrition Related to Puberty. A survey was conducted among girls of the

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Durban area of South Africa to ascertain environmental factors which are related to the age of menarche. The article deals principally with the influence of menarche on school leaving and with the methods used in the survey. There are a few references to data which appear to indicate that poor nutrition is one of the factors which delay puberty.

ADULT LEADERSHIP

Vol. 2, May, 1953

* How to plan and run a conference. R. A. Luke, P. Anderson, R. Beckhard, W. L. Smith, and C. K. Demorest.—p. 13.
* Rehearsal for leadership. W. Dickerman.—p. 21.
* Organizing for work. F. Anderson, M. Davis, R. Johnson, and R. Sillars.—p. 23.

Vol. 2, June, 1953

* What is leadership training? Issue Committee.—p. 2.
* Improving the processes of leadership training. Issue Committee.—p. 11.
* Designing the training group. Issue Committee.—p. 21.

Conference Planning and Management. Organizations that hold or plan conferences are thereby expressing basic policy, for the conference is a means of achieving a goal of the organization. Development of a basic conference plan is thus a primary responsibility of the policy group and cannot be delegated. If this group takes time to discuss questions and formulate policy statements regarding conference activities, it will have laid a solid foundation on which program planning committees can build. Samples of two agenda and a policy statement, which the governing body may use, are shown. Problems in planning and running a conference, after policy is established, and specific duties of the chairman are enumerated. Planning, management, and wind-up activities of a conference are presented in a detailed outline, and an operations chart shows duties of chairmen and committees. Reporting is also covered briefly. One organization, before holding an institute, sent a questionnaire to key staff to learn their particular interests and involvements. This was developed into a guide to registration for the various work groups of the institute.

Leadership Training. Well selected and prepared leaders are essential to small work groups, the basic units of work conferences. A discussion leader and a recorder are almost sure to be on the leadership team, and an observer and/or resource personnel may be added. Two principles of efficient team operation are: each member should understand his special responsibilities and be able to carry them out effectively; and the team should preplan its method of cooperating to help its group toward the best possible thinking and production. Proper selection of leaders may *per se* effect the first desideratum; however, it is almost impossible to fulfill the second without preconference rehearsals and training. Procedures used in preparing leaders for one work conference are narrated. A "job sheet for conference recorders" is presented.

Group Participation. Platform-dominated conferences are becoming extinct in favor of audience participation which satisfies better the need for individual and group achievement. This is accomplished by coming to grips with two organizational problems: setting up work groups and planning for communication between the several parts of the conference. Both of these problems are discussed. Warnings are issued against the major pitfall of letting tradition and inertia make conference planning routine and the minor one of overcomplicating procedures.

What is Leadership Training? Military officers, agricultural extension workers, labor leaders, policemen, and student nurses are only a few of the groups participating in leadership-training activities in the U. S. today. Diverse as their programs may seem, five learning goals with respect to human understanding appear in all. These goals are listed. It is noted that adaptation to specific circumstances is vital in all programs of training for leaders, and that a "canned" program would not work for any group.

Improved Leadership Training. Three phases comprise proper training for improved leadership. In the first, the leader-to-be prepares to change, i.e., he identifies the factors in his performance which need changing and learns objectivity toward himself. Phase two involves the learning and practice of planning and performing as a leader with others' help. In phase three, he transfers the changes he has learned to the back-home or job situation where he will be an actual leader. The phases and their subdivisions are presented in chart form with suggestions both for the training leader (teacher) and the leaders-in-training. Detailed discussion in the text supplements the chart.

Selecting Training Groups. To achieve their objectives, those who set up training programs must select the number and kinds of people who are to work in each group. For example, if active, individual participation is required, the group should be kept at face-to-face talking size. Objectives may also affect the degree of homogeneity necessary in a group, whether of age, sex, education, or socioeconomic status. At times, people should be allowed to choose congenial co-learners; at other times, it is good leadership training to begin with a group which is not overly congenial. Advantages and disadvantages of homogeneous and heterogeneous groups are listed.

ALLIED FOOD AND BEVERAGE

Vol. 16, June, 1953

* What should a waitress know? G. L. Wenzel.—p. 9.

What Should a Waitress Know? The average waitress today earns far more than a teacher and some make more than many business men and executives. A waitress with "professional spirit" takes real pride in her work, and guests are quick to sense it. In appearance, she dresses so as not to be offensive to the guests. A good waitress organizes work ahead of time, i.e., fills sugar bowls and salt and pepper shakers, has a clean towel and napkins handy, uses tidy menus, and so on. In a restaurant, the customer expects to be acknowledged promptly with a smile, to be seated and offered a glass of water and a menu. When the food is ready to be picked up, no time should be wasted. The guest should not feel he is being neglected if he must wait. The waitress should suggest only that which she believes in sincerely. Suggestions should be definite—tell the guest that the hamburger is ground every day in the kitchen if it is. The waitress can make the service so good that the customer will be sure to return.

AMERICAN RESTAURANT MAGAZINE

Vol. 37, June, 1953

* Swiftly growing restaurant business may soon be 2nd greatest industry in the United States. J. F. Vollmer.—p. 58.

100 profit pullers for practical restaurant operation.—p. 64.

* More money in modern meat cookery. J. A. Cline.—p. 86.
* Cool profit-makers for hot weather menus. L. D. Freeman.—p. 104.
* Packaged profits in box lunches for take-out trade.—p. 122.

Vol. 37, July, 1953

* Come-back-again appeal for summertime meals.—p. 48.
* Magic in the kitchen for hot weather menu making. L. D. Freeman.—p. 82.

Expanding Restaurant Business. The restaurant business is today the fourth largest industry in the United States, but it may soon be the second. To keep pace with this rapid increase in volume, restaurants need better controls on food received, recipes used, and portions served. They also need more time- and labor-saving machines which are well planned and easy to clean. The most vital point is that the restaurant manager must be the captain of a well organized, smooth working team of capable people who are interested in their job of feeding the public.

Meat Timing. Time-tables are given as an aid in planning low-temperature cooking schedules for braising, roasting, and cooking meat in liquid (simmering and making stews). Although roasts simply cannot be timed accurately for doneness and a meat thermometer is a necessity to determining doneness, tables giving appropriate cooking times can and should be used in scheduling work loads. Time is a fairly accurate guide for the doneness of meats cut a definite thickness and weight, such as Swiss steak, short ribs, cutlets, and chops, and for moist heat methods of cooking. The wide variety of equipment in use makes generalized time tables for broiled, grilled, and fried meats impractical, but the author recommends that each operator work out time-tables with his own equipment. Such tables, posted in the kitchen, can help the inexperienced cooks as well as help as an aid in scheduling work.

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U. S. dessert, ice cream, may be served plain or in elaborate desserts, to fit the meal and the customer's taste. Many suggestions are given for fruit, nut, and sauce toppings as well as other ways to serve ice cream.

Box Lunches. Slipshod "send-out" sandwiches cannot compare with the modern attractive box lunch, carefully packaged. Package design is important for the box lunch; it must be sturdy, attractive, and not too costly. Paper dishes are not only good temperature insulators; they eliminate "pick-up" trips and the annoyance of dirty dishes on desks. Box-lunch services of four large restaurant chains are described.

Sherbets and Fruit Ices. Appealing color and flavor, smooth texture, and sharp cold temperature of sherbets and fruit ices heighten the appeal of other foods by contrast. These products offer the restaurateur the advantages of customer appeal, easy storage and handling, low labor and preparation costs, and no waste. Far from being merely a dessert, they are adaptable to almost any course. Suggestions are given for using sherbets and fruit ices in appetizers, salads, main-course accompaniments, desserts, and fruit-plate meals. Recipes for four summer drinks using sherbets and fruit ices are also given. Costs per dipper of sherbets or ices, using various size dippers, and the dipping yield per gallon are tabulated.

Summer Menus. Garden-fresh produce, as well as meats, poultry, and fish, which are plentiful in hot weather, should be used to the fullest extent for tasty summer meals. Numerous menu suggestions are given for both hot and cold summer luncheons and dinners.

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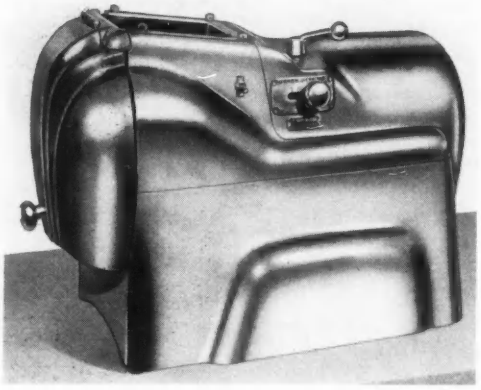

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COLLEGE AND UNIVERSITY BUSINESS

Vol. 14, June, 1953

* Noninstructional employes like "at home" meetings. C. W. Hoff.—p. 31.

* How the dietitian can satisfy her student customers. M. E. Yost.—p. 49.

Vol. 15, July, 1953

* Food service finance in the small college. A. Huguley.—p. 47.

Employee Orientation. The University of Omaha has found that orientation lectures for noninstructional employees have greatly improved morale. In such a program the objectives and procedures of various departments are explained as well as the University's administrative organization.

Pleasing Student Customers. The author believes there are two cardinal rules in satisfying student customers in college food service: (a) give the student the food he likes prepared the way he likes it and in sufficient quantity, and (b) maintain *esprit de corps* between the dietitian and students and between the dietitian and her aides. Both rules are discussed.

Small-College Food Service. Dining hall procedures at Northwestern State College, Alva, Oklahoma, are described. The author notes that a well operated college food service should have a threefold objective: good nutrition, protection of the student's dollar, and attractive atmosphere. Secondary contributions may be in public relations when outsiders are served and as a work experience for home economics students. Cost controls, which must be enforced by the use of records, may be divided into five major functions: production, quality controls, equipment and depreciation, employees, and reports and accounting. Each of these is discussed in some detail, as is the college's method of charging students.

FOOD ENGINEERING

Vol. 25, June, 1953

Radical method of preparing doughs shortens bread making.—p. 60.

* How store lights fade pickles. F. W. Fabian and F. L. Baldwin.—p. 61.

Ingredient special with IFT show guide:

* The growing role of phosphates. R. A. Barackman and R. N. Bell.—p. 68.

* Better pectins. They improve many processed foods. G. H. Joseph.—p. 71.

* Corn sweeteners help processors in many ways. R. F. Cohee, Jr.—p. 74.

* Whipping emulsification cuts cake costs, raises quality. L. B. Crossland and H. K. Beasley.—p. 77.

* Natural spices add much more than flavor J. J. Frank.—p. 78.

* Synthetic vitamin A aids food fortification. J. C. Bauernfeind, A. D. Rokosny, and G. F. Siemers.—p. 81.

* Starches tailormade for users. T. A. White.—p. 95.

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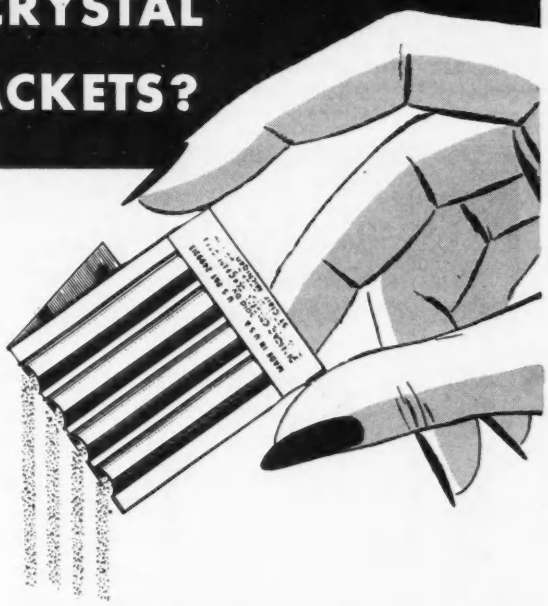

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* Advanced food processing with improved fats and oils.
  1. Factors in lard's comeback. W. C. Ault and R. W. Riemenschneider.—p. 99.
  2. New fats that stay plastic. R. O. Feuge.—p. 100.
  3. Soy oil flavor stabilized with metal inactivators. J. C. Cowan.—p. 103.
* Gum type stabilizers perform new vital functions. FE Staff.—p. 105.

Pallid Pickles. Green color fades when jars of pickles are exposed to fluorescent lighting, an almost universal situation in supermarkets. A study indicated that the cause of bleaching was purely photochemical. Oxygen did not assist bleaching, although it is doubtless a factor influencing color under other conditions. Significant protection, caused perhaps by compression of chloroplasts, existed only where pickles were tightly pressed against the jar. Sugar in the brine also tended to offset bleaching. Earliest and severest bleaching came from "daylight" and standard cool lamps, while warm white lamps did the least damage. Fresh pasteurized dill pickles suffered the most.

Phosphates. Phosphates may be used in foods either for their nutritive value or for performing functions distinct from their food value. These functions are: as enrichment in foods; to control *p*H or produce buffering action; as acidifying agents; and as emulsifying, coagulating, or peptizing agents. Cereal enrichment with iron and calcium phosphates is well known. In evaporated milk, disodium phosphate exhibits a buffering action. It is also used in certain precooked meat products to minimize shrinkage and produce traditional flavor, as in hams. As an acidifying agent, phosphoric acid is added to soft drinks. Other uses of phosphates are discussed, and their control in manufacture is covered.

Pectins. Food uses of pectins are discussed in relation to the physical characteristics of dry pectins and pectin gels. The main portion of the article is concerned with the low methoxyl pectins which can be used to produce such products as tomato aspics and fruit purée gels with reduced sugar for ice creams. The use of pectin in dietetic foods is mentioned, as well as its application to certain food emulsions, glazes, and confections.

Corn Sweeteners. In this article are discussed the properties and utilization in industry of dextrose and corn sirup. There are three commercial classifications of corn sirups, according to their dextrose equivalent. Corn sirup solids, except for moisture content, have the same composition as liquid corn sirup. The value of corn sirup in making candy and preserves is due to its resistance to heat discoloration, and in manufacturing ice cream, to its depression of the freezing point. Largest food use of dextrose is in the baking trade. In addition to the economic advantage, it is deemed by many bakers to give better crust color and flavor. Cohesive properties are used in chewing gum, breakfast cereal coatings, and cake icings. Dextrose has been used to advantage by canners and also as a flavor-carrier in meat seasonings, summer drink powders, pudding powders, and gelatin desserts. It is frequently used in infant feeding and is an important primary ingredient for intravenous feeding.

Whipping Emulsification. Results of a study on the uses of a whipping emulsifier to cut costs and improve the quality of cakes are presented. The only formula difference in the cakes tested was the type of fat and the inclusion or omission of a whipping emulsifier with each type of fat. The fats used were salad oil, butter, lard, regular shortening, and emulsifying shortening. Results indicate that all five fats are suitable for cake baking, provided a whipping agent is employed to promote aeration of the batter. With a whipping emulsifier, savings are realized on labor and ingredients by (a) halving the working time required at mixers, (b) increasing the batter-production capacity, (c) taking advantage of bulk-handling economies through use of oils, and (d) using less-expensive bland oils which produce cakes that are easy to handle. Greater uniformity of product was noted when the whipping emulsifier was used.

Natural Spices. Many interesting facts are presented concerning natural spices and their use as an antioxidant to retard development of rancidity in fatty products, as a flavor stabilizer in many packaged foods, and as a flavor promoter by improving the aroma and appearance of unattractive foods. It is noted that the results of present research in the field of natural spices so far coincide with the present theories as to the value of natural

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1¾ cups (12 ounces) Lemon Jell-O
1½ quarts hot water (140°-160°F.)
½ cup vinegar
2 cups mayonnaise
2 teaspoons salt
½ teaspoon pepper
3 tablespoons finely chopped onion
18 (1½ quarts) diced hard-cooked eggs
2 cups diced celery
¼ cup chopped pimento
¼ cup chopped green pepper

1. Dissolve Jell-O in hot water.

2. Add vinegar, mayonnaise, salt, and pepper. Blend with beater. Chill until slightly thickened. (Place in freezer or over crushed ice to shorten time.) Then beat until fluffy.

3. Fold in remaining ingredients. (If necessary, place bowl again in freezer or over crushed ice a few minutes to thicken Jell-O mixture slightly so that vegetables keep evenly distributed.)

4. Pour into loaf pans. (For display loaves, first arrange 1 sliced hard-cooked egg in bottom of each pan.) Chill until firm. Cut in slices. Serve on crisp greens with garnish of mayonnaise and pimento strips. Makes 32 portions, 4 ounces each. Only about 5¢ per portion.

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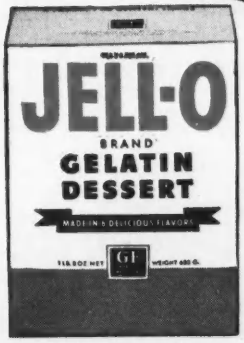

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spices. Buying suggestions for the food processor are: buy best quality, buy moderately, and buy frequently. The proper storage area for spices is important and instruction and warnings are enumerated. A table listing most of the well-known spices, their origins, and the foods they enrich accompanies the article.

Synthetic Vitamin A. Synthetic vitamin A is well suited for fortifying not only margarine, but also candies, ice cream, and peanut butter. Tests indicated that the synthetic is as stable as the natural product and it is free from the fish odor and taste.

Tailormade Starches. Raw starches used commercially are: corn, potato, sago, tapioca, arrowroot, and amioca. Because they do not always meet the needs of the food industry, specialty starches are now being manufactured. Examples are confectioners' starch, chiefly used in gum drops; redried starch, used in baking powder; and pregelatinized starch, used in cold-swelling puddings. Suggestions for using starches in order to obtain uniform products are: standardizing cooking procedures, cooling immediately and uniformly, adding other ingredients at the proper time, and practicing cleanliness.

Improved Fats and Oils. Factors in lard's comeback are discussed. Research has shown it to be equivalent to vegetable oils in digestibility and nutritive value. Its tendency to rancidity can be overcome, and its physical character can be changed to make it more plastic. Such "rearranged" lard produces cakes of greater volume and lightness. Wider use of lard is forecast due to its economic advantage over butterfat and vegetable oils . . . Need is felt for two new types of fats: (a) a plastic, non-greasy fat which might be used as a protective covering for food products such as wieners, cheese, raisins, and nuts; and (b) a fat which will remain liquid, or at least highly plastic, at temperatures well below the freezing point of water. Recent research has developed acetostearins, in which acetic acid is introduced into a hard fat or stearine, which may answer these needs. . . . Flavor problems in soybean oil and shortening have been found to be due to small amounts of trace metals, such as iron and copper. Research to overcome this indicates that fat-soluble metal inactivators, such as phytic acid, may produce better flavor.

Gum Stabilizers. From ancient gum arabic to brand-new gum guar, basic functions of stabilizers are to thicken, suspend, gel, or emulsify. Each stabilizer has its own good and bad characteristics, and to take advantage of the good properties of any one, a second or third may be added to offset some of the drawbacks. Gum-type stabilizers fall into three broad classes: natural gums, synthetic gums, and others such as pectin and gelatin. Their present use in frozen products is primarily confined to desserts. Stabilizers suspend flavors in liquids and give eye appeal to baked goods, i.e., fruit fillings of pies and meringues. There are also applications in the making of candy, processed meats, starch puddings, and cheeses.

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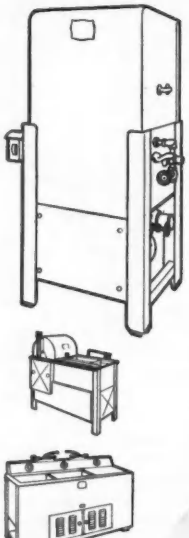

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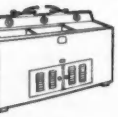

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HOSPITAL MANAGEMENT

Vol. 75, June, 1953

* Building a larger kitchen for an expanding hospital. A. E. Maffly and S. Mitchell.—p. 41.

Today's word on tomorrow's kitchen equipment. C. D. Gullickson.—p. 46.

* Central food service pays for itself. E. L. Bliss. —p. 84.

Kitchen Planning. The new kitchen at Herrick Memorial Hospital, Berkeley, California, was engineered to provide fast efficient service within the limitations of the rectangular area available. As much as possible, a straight-line flow of food from receiving to serving has been effected. Freezer storage space, reached through the walk-in refrigerated areas, eliminates the danger of sudden changes of temperature. The dairy refrigerator is accessible either through a side walk-in door or from front reach-in doors. The vegetable and salad preparation units are arranged so that workers from both units can readily reach equipment and supplies needed, and the garbage disposal unit is placed so that it may be jointly used by both sections. All equipment is set on cement islands for easy cleaning. A special conveyor system is used for centralized service for patients, except those in the psychiatric unit who are served family style. An open bain-marie with modular pans was installed in the

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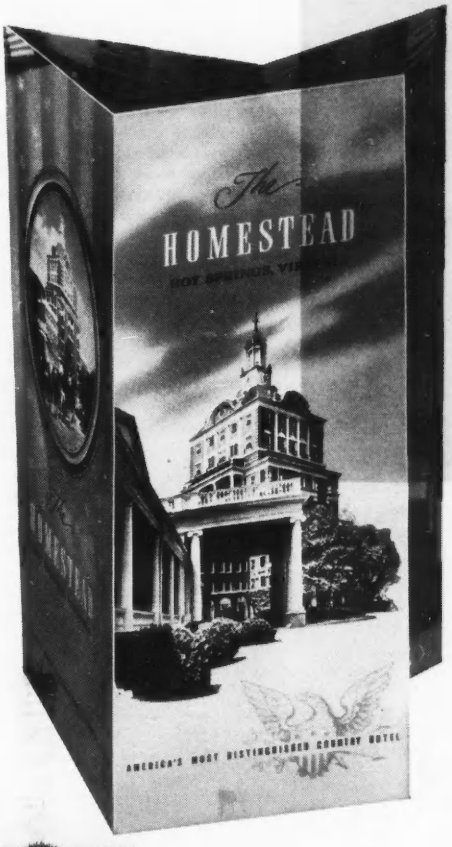

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Thomas J. Lennon, Manager at The Homestead.

Fine chinaware, crystal and silverware are kept spotlessly clean by Calgonite at The Homestead, Hot Springs, Virginia.

cooking section for keeping food hot. From here, food is sent in electrically heated bulk food carts to the psychiatric unit, the cafeteria, and the coffee shop. A two-way intercommunication system is also proving its worth. Special attention was given to atmosphere; a green terrazzo floor contrasts with creamy tile wainscoting and ceiling and walls of pale gray-green. Recessed ceiling lights produce a very modern effect.

Central Food Service. Before the new 123-bed Jackson-Madison County General Hospital, Jackson, Tennessee, had been in operation for even a year, plans were begun for new construction which would add 75 beds. The food service originally installed depended on decentralized service with four heated food trucks loaded in the main kitchen and tray set-up being done in floor pantries. With the prospect of a 200-bed operation, the administration decided to switch to centralized service, using thermos-type plate holders to keep food hot. Such a change, it was estimated, would reduce dietary department personnel from thirty-three persons to twenty-three, even with the addition of 75 more beds. More effective portion control was also anticipated, which would also effect savings. With the combination of lower payroll and lower food costs, it was decided that the new installation would pay for itself, and at the same time, provide hot food hot and cold food cold for patients. The predicted savings have been realized as well as greater patient satisfaction.

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HOSPITALS

Vol. 27, July, 1953

* Staff coordination: the key to food quality control. E. S. Drake.—p. 111.
* Cafeteria prices—add service, preparation costs. M. M. Harrington.—p. 112.

Working Together for Quality. Factors in producing good quality meals include: specifications for all purchases; proper receiving and storage; standardized recipes, portions, and service; proper preparation and cooking procedures; and patient contacts to learn if the food is sufficient and palatable.

Pay Cafeteria. Hospital management, like industry, has realized employees' right to spend their earnings as they see fit. Pay cafeterias, therefore, have replaced the old paternalistic family-style service in many hospitals. The pay cafeteria at Harper Hospital is described. All foods in the proper price range on the master menu for patients are served in the employee cafeteria, plus supplementary foods for variety. Selling prices of foods are based on direct and indirect charges to the department, and careful cost control of portions and selling prices is observed. Recipes and serving portions are standardized, and careful studies and controls are carried out to assure uniformity in yield, especially in meats. Supervision insures the carrying out of policies and maximum utilization of personnel.

HOTEL MANAGEMENT

Vol. 63, June, 1953

* Food briefs.—p. 19.

Food Briefs. Ascorbic acid is now being added to sauerkraut to prevent darkening and improve the flavor . . . Pressing potato chips into bars gives a concentrated source of food value. The processing retains the nitrogen, carbohydrates, and minerals. The bars are being tested by the Armed Forces . . . A new cultured cream spread and salad dressing have been developed which may provide a new use for milk, cream, butterfat, and nonfat milk solids.

THE HOTEL MONTHLY

Vol. 61, July, 1953

* Perk up jaded summer appetites.—p. 47.

Citrus Aids to Appetite. Citrus fruits and juices are ideal brighteners for the summer menu. Processing of frozen concentrates in a Florida plant is described and illustrated. General facts about concentrated juices and recommendations regarding storage are given. Recipes and suggestions for dishes using citrus fruits and juices are also included.

THE MODERN HOSPITAL

Vol. 81, July, 1953

* Build the food service from the top down. H. Prather.—p. 110.

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Teamwork. Cooperative development of a dietary department should begin with the board of trustees, or the top control in a state or federal hospital. The dietitian and the administrator can both be more effective if trustees understand the dietary department's purpose and some of its problems. Necessary new equipment will come forth more readily, and 1952's budget will not be expected to cover 1953's expenses. In many departments, including the dietary, many faults can be avoided if qualified consultation is obtained when plans are drawn. Effective function of the dietary department depends to a large degree on a clearer understanding of what the hospital itself stands for. Over-all policies and proper lines of authority must be defined. The administrator should tell the dietitian the type of service desired and other things expected of her, as well as what she can expect of him. Cooperation between the administrative dietitian and the administrator is one of the most important factors in developing a good dietary service. The administrative dietitian's need to cooperate with other department heads is emphasized.

PERSONNEL JOURNAL

Vol. 32, June, 1953

* Some characteristics of successful executives. C. Argyris.—p. 50.

Successful Executives. Development of future executives was a major problem discussed in managerial workshops the author attended. In this article, ten characteristics are discussed briefly in an attempt to outline qualities which seem helpful in becoming and remaining successful executives. These are: exhibited high frustration tolerance; encouraged full participation; continually questioned selves; understood "laws of competitive warfare"; expressed hostility tactfully; accepted victory with controlled emotions; never became shattered by defeat; understood need for limits and "unfavorable decisions"; identified selves with groups; and set goals realistically.

RESTAURANT MANAGEMENT

Vol. 72, June, 1953

* How to plan and equip a restaurant for maximum labor saving. E. Thrasher, J. Crouch, and J. H. Overholser.—p. 49.
* Serving salads that sing with flavor. A. Easton. —p. 53.
* Pork—more meat for your money. P. F. Muellet. —p. 62.

Planning for Labor Saving. This report shows how a California restaurant bought equipment to suit its own specific needs, giving consideration to the selection of the equipment and to the design of the building so that it would be convenient to work in as well as attractive. The owners made a study of every motion made in the restaurant to provide compactness and to hold and store food where it was needed. Some of the features of the specially-planned backbar include refrigerated, self-closing drawers under the grill for refrigerating hamburger patties and other raw meats; warming drawers for keeping roasted meats: and dish dispensers, both heated and chilled, where they are needed. There are also roll warming drawers and a heated cracker crisper. Household toasters are located so that they may be placed before the customer for his own use.

Salads with Flavor. Today's salads are served as appetizers, main courses, and desserts. The problem in planning a main-course salad is to achieve the proper combination of foods with sufficient protein. Cleanliness and crispness in preparation of salads are essential. Greens, fruits, and vegetables should be broken into bite-size pieces. New and interesting combinations, such as sliced apricots in pitted prunes, add color to salad plates. A variety of salad dressings should be suggested.

Pork Cutting. Pork is the subject of the third article of a series on the new meat-cutting method, planned to increase yield by 20 per cent. Percentage yields of the various cuts are listed beside a carcass-diagram. Steps in the cutting method are illustrated in photographs. Rules are given on such topics as: maximum number of portions; less shrinkage; shorter cooking time; elimination of wasteful cuts; improved carving methods; increased yield of popular and profitable cuts; weights and grades of carcasses; and curing and smoking. A breakdown of weights, percentages, wholesale fabricated prices and cost, and portions is illustrated.

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Legion's new attractive hospital service is seamless drawn stainless steel. No cracks or corners to catch dirt — easy to clean and sterilize. They are unbreakable, non-porous, need no refinishing or replating. Lustrous platinum finish with attractive border decorations.* *No tax.*

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S-1509-3	Plate Cover	S-115-O	Round Casserole

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There are probably many of your geriatric patients with small, fixed incomes, an unwillingness to spend time in food preparation, and little or no cooking and storage facilities. For them, eating is a chore rather than a pleasure . . . and they are likely not to be so faithful in following your recommendations.

Gerber's Strained or Junior (Chopped) Foods can help overcome these obstacles. Gerber's are easy to buy, to store, to prepare. Sold in convenient sizes, Gerber's are available the year 'round at practically all independent and chain grocery stores.

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4 CEREALS • 50 STRAINED & JUNIOR MEATS, FRUITS, VEGETABLES, DESSERTS

News Notes

Certifying Examinations. The American Board of Nutrition will hold certifying examinations in Atlantic City, during April 1954. Completed applications of persons wishing to be considered for certification should be in the office of the Secretary not later than February 1, 1954. Application forms may be obtained from the Secretary, Dr. Otto A. Bessey, Department of Biochemistry and Nutrition, The University of Texas School of Medicine, Galveston.

Interns Graduate. At a dinner and exercises held on July 8, certificates were presented to thirteen dietitians on completion of their internships at *Saint Marys Hospital*, Rochester, Minnesota. Dr. Louise Stedman, Director, School of Home Economics, University of Minnesota, was guest speaker. Others who addressed the group were: Dr. Russell M. Wilder, formerly Chief, Department of Medicine, Mayo Foundation, and recently Director, National Institute of Arthritis and Metabolic Diseases, Bethesda, Maryland; and Dr. George W. Logan, consulting physician in medicine and Chairman of the Committee on Dietetics of the Mayo Clinic. An award, consisting of a check to cover full expenses to the A.D.A. Annual Meeting in Los Angeles, was presented to the outstanding intern, Sister M. Rudolph, Wheaton, Illinois. The Mary Agnes Foley prize of $50, presented for the first time this year, went to Sister Mary Jean, Jamaica, New York. This prize is given to the dietetic intern showing exceptional skill in teaching patients with diabetes. Dietetic interns who received their certificates and pins are: Paula Armitage, Joanne Bugbee, Phyllis Charest, Dolores Deegan, Susanna Edmonds, Carolyn Harmon, Camilla Kotrba, Mary Ladner, Mary Sue Mason, Marie Murphy, Esther Sevenich, Sister M. Leander, and Sister M. Rudolph.

Graduation exercises were held for nine dietetic interns at *VA Hospital, Hines, Illinois*, on July 10. Alice Biester, Head, Food and Nutrition Department, University of Minnesota, gave the commencement address. The graduates are: Virginia P. Akers, Joanne Cardon, Margaret M. Dore, Marilyn Fulton, Janet Green, Ruth Kohlmetz, Hiroko Ochi, Lorraine Scarleski, and Ruby Wimberly

Seven interns completed their training at *University of Illinois-Cook County School of Nursing* in Chicago on July 15. Dr. Arthur Bernstein, Assistant Medical Director of Cook County Hospital, spoke on "Coming Events," after which Millie E. Kalsem, Director of the hospital's Dietary Department and internship, presented certificates and pins to: Jacqueline Connaughton, Mary Elizabeth Enders, Jean Graves, Betty Ichishita, Doris Lovelace, Harriet Milewski, and Arlene Sax.

Plentiful Foods. According to the U.S.D.A., the following foods are expected to be plentiful during September:

Protein foods

Fish, fresh and frozen
Milk and other dairy products
Turkeys

Other foods

Honey	Shortening
Peanuts and peanut butter	Table fats and salad oils
Potatoes	Vegetables, locally grown

Purchasing Guide. *Food Purchasing Guide* has been published by the American Hospital Association as Publication No. G-6753. Prepared by Margaret Gillam, formerly Dietetics Specialist, A.H.A., the *Guide* is designed to provide easy reference material on purchasing requirements to those using the A.H.A. "Master Menu" plan. The sections on meat and fresh fruits and vegetables were originally published in the A.H.A.'s Management Guide in June 1951. Other sections in the book concern: poultry; fish; frozen and dried fruits and vegetables; baked goods and cereals; milk, cheese, and eggs; fats and oils; and miscellaneous foods. The material is presented entirely in tabular form and includes the following data on each food: unit of purchase, weight in pounds per unit A.P., size of serving portion, servings per purchase unit, purchase units to serve 25 and 100, servings per pound A.P., additional information, and portion cost fraction. Instructions for calculating food requirements are given, as well as a short bibliography listing materials helpful in food purchasing which are available from the A.H.A. library for loan.

The ingenious design of the *Guide* combines function and attractiveness. It is spiral-bound, with tabs setting off each section. The size is practical for desk use—9 by 6 in.—and the outside back cover contains an accordion pleat, making it possible to stand the book on the desk. The designing and printing in two colors is also attractive. The *Food Purchasing Guide* is available from the American Hospital Association, 18 East Division St., Chicago 10, for $1.75.

Conference Helps. Four aids to conference planning are now available from *Adult Leadership* magazine. The materials are comprised of a "job sheet" for each of the following conference-connected persons: discussion leader, resource person, recorder, and observer. Each sheet explains the person's role in a conference and makes specific suggestions. The sheets are available in packet form from: Adult Leadership, Box F, 743 North Wabash Avenue, Chicago 11.

Government Publications. *Proceedings* of the *National Food and Nutrition Institute* has been issued by the U.S.D.A. as Agriculture Handbook No. 56. This 161-page report was prepared under the leadership of the Bureau of Human Nutrition and Home Economics in consultation with staffs of other sponsoring agencies. The papers presented at the Institute—December 8 through 10, 1952, in Washington—are included, as well as the seven discussion-group reports and a summary of the panel discussion on coordination of nutrition activities. The *Proceedings* is available from the Government Printing Office, Washington 25, for 65 cents a copy.

The U.S. Office of Education has prepared a four-page leaflet on "Business-Sponsored Home Economics Teaching Aids: Their Preparation and Use." It is the result of work of a committee of home economists in business and education called together by the Home Economics Education Branch of the Office of Education. It is concerned with "characteristics of acceptable supplementary teaching materials for use by home economics teachers and students." Information included covers a list of topics on which information for teaching purposes is needed, criteria for acceptability, and points to consider in preparing teaching materials. Copies may be obtained from Office of Education, Department of Health, Education, and Welfare, Washington 25.

The Bureau of Human Nutrition and Home Economics: What It Is . . . What It Does is available from the Bureau in a revised edition. Its twenty-four pages contain a brief description of research being done by the Bureau in its various laboratories, its methods of obtaining data, methods of selecting employees, and other general information. A short history of the agency is given, from its establishment as the Bureau of Home Economics in 1923. The booklet may be requested from: Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, Washington 25.

Tomatoes on Your Table has been released as Leaflet No. 278, another revised publication of the Bureau of Human Nutrition and Home Economics. Printed throughout in tomato-red, the leaflet begins with tips on care of tomatoes. Recipes proceed from simple stewed tomatoes through main dishes, salads, soups, marmalades and relishes, and desserts such as green tomato mincemeat cookies. This leaflet may be purchased for 10 cents a copy from the Government Printing Office, Washington 25.

New Bibliography. *Nutrition Bibliography of Malaya*, a compendium of

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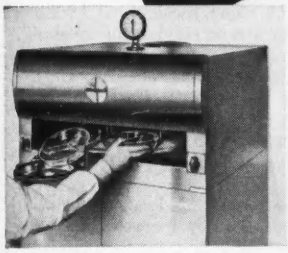
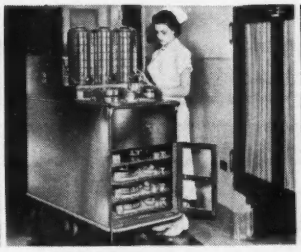
Nothing Protects and Serves Fine Foods like mealpack Exclusive Self-Forming Vacuum Seal



Mealpack Infra-red Dish Heaters *uniformly pre-heat and sterilize each Pyrex Dish ready for packing as the "heat storage battery."*

Mealpack Tables *centralize Container packing and tray assembly at the main kitchen —from 100 to 500 trays per hour.*



Mealpack Tray Carts *act as "portable floor pantries." Hot toast, soups, beverages, ice cream, etc., are added to each tray at serving points.*

All patients enjoy uniformly delicious food because hot foods stay HOT *and cold foods stay* COLD *for hours—even after serving!*

Millions of meals every month are being served the **mealpack** way in hundreds of hospitals, coast to coast! A personal study of nearby installations will prove **mealpack's** exclusive advantages and economies for your food service.

Whether for old or new buildings, additions, or for serving outlying units remote from the main kitchen, a **mealpack** SYSTEM can be custom-fitted to meet your specific needs and conditions. Current installations range from 20 to over 500 beds.

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Newest addition to MEALPACK'S *Fleet, the Model HC "***Hostess Cart,***" for auxiliary services. Beautiful, compact, profitable! Literally a combined Snack-Bar, Gift Shop and News-stand "on wheels." Also, doubles for organizing, controlling and serving between-meal nourishments. Ask for* **Leaflet SD-7.**

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CELLU VEGETABLE SOUP—Made with celery, cabbage, string beans, tomatoes, beef extract, onion, salt and water. In No. 2 cans.

CELLU VEGETABLE RELISH—Made with celery, cabbage, green pepper, onion, salt, vinegar, spices (no sugar). In 8 oz. jars.

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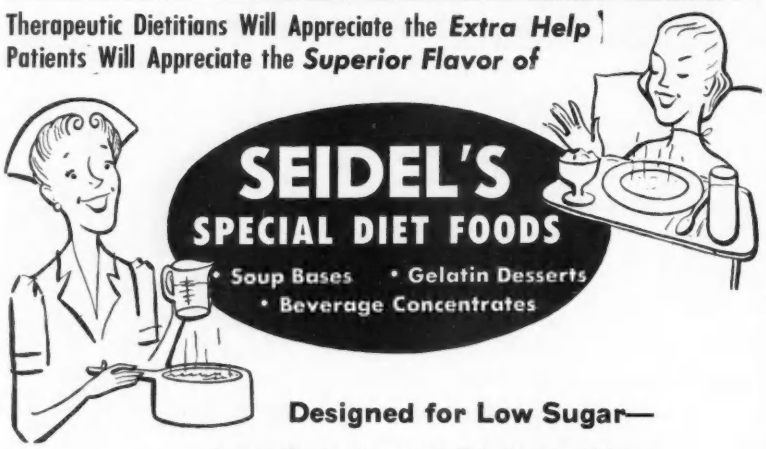
Patients Will Appreciate the *Superior Flavor of*



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Low Calorie and Diabetic Diets

Developed in consultation with dietitians from many leading hospitals and chemists from Abbot Laboratories—Seidel's Special Diet Foods contain Sucaryl Calcium*, the new sweetening agent that is thirty times sweeter than sugar and *does not have any disagreeable after taste*. Taste panel tests show marked preference by patients for these new special foods over anything presently on the market. Moreover, heating in any degree does not injure their palatability. All products are very simple to prepare for serving and will save much effort. Packed in convenient jars and bottles for use as needed. Copy of Analysis by Independent Laboratory showing low Sodium and other content available on request. Price list and samples on request.

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seventy-two references on Malayan nutrition, has been published by the University of Hawaii Press. The booklet, covering the literature through June 30, 1951, was compiled by Dr. P. C. Leong of the University of Malaya. This is the second annotated bibliography resulting from the recommendation made at the Seventh Pacific Science Congress that such works be prepared for the Pacific area. First in the series was *Pacific Islands Nutrition Bibliography* (see this JOURNAL, January 1952, page 78). Bibliographies for other Pacific regions are being prepared under the supervision of Carey D. Miller, Professor of Foods and Nutrition, University of Hawaii. *Nutrition Bibliography of Malaya* is available from the University of Hawaii Press, Honolulu 14, for 65 cents a copy, or $1.50 in combination with *Pacific Islands Nutrition Bibliography*.

Booklet about Toast. "Toast Talk" is the inviting title of a colorful booklet released by the American Institute of Baking. In its twelve pages are contained thirty recipes using toast. They cover such diverse dishes as butterscotch pecan toast, fresh vegetable rabbit, rolled stuffed fish fillets, and mushroom milk toast. A short section on "Toast Points" gives tips on service and general information. Single copies of the booklet are available free from the American Institute of Baking, 400 East Ontario Street, Chicago 11. Quantity prices are: $2 for 40 copies, with additional copies in lots of five at 5 cents per copy.

Books for Israel. Medical, scientific, and technical books, desperately needed in Israel, can now be sent to that country through a cooperative project sponsored by the U. S. Department of State. Inability to obtain dollar exchange for purchase of the books in the U. S. has critically handicapped acquisition through ordinary channels. Requests are being made for books published since 1940, which have been superseded by newer editions. Such books should be sent by prepaid parcel post to: Books for Israel, 115 King Street, New York 1. Up to 70 lb. may be sent by parcel post, at 8 cents for the first pound and 4 cents each additional pound. Packages should be marked "Book Rate." Return addresses of individual donors or of organizations should be given so that gifts may be acknowledged. Funds for shipment from New York to Israel have been provided under Point IV by the U. S. State Department.

Meetings. The 81st annual meeting of the *American Public Health Association* and annual sessions of forty related organizations will be held in New York City, November 9 through 13. "Meeting the Health Needs of the Community" will be the theme of the meeting.

Grain Sanitation Committee. The U. S. Departments of Agriculture and of Health, Education, and Welfare have jointly announced the appointment of a seventeen-member advisory committee on grain sanitation, which first met in

Meat...

and the Important Role of Protein in Hemoglobin Synthesis

Although the relationship between iron and hemoglobin formation is widely appreciated, the important role played by protein in hemoglobin synthesis is relatively obscure. Nevertheless, since globin is just as much a component of the hemoglobin molecule as is iron, the continued synthesis of this protein is necessary for normal hemoglobin production.

It has recently been estimated that in the average adult 8 Gm. of globin is destroyed daily.[1] This means "that approximately 14% of the total dietary protein intake of the average adult [female] is required solely for the resynthesis of new hemoglobin. These data reemphasize the importance of adequate protein, as well as iron, intake for the maintenance of a normal rate of hemoglobin synthesis in man."[2]

Because meat is an outstanding source of *both* iron and high quality protein, it is always recommended in generous amounts in the dietary management of hypochromic anemia. These nutritional values, as well as its significant content of B vitamins, also make meat an important component of the daily diet of normal persons.

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1. Drabkin, D. L.: Metabolism of Hemin Chromoproteins, Physiol. Rev. *31*:345 (1951).
2. The Biosynthesis of Hemoglobin, Editorials, J.A.M.A. *150*:1223 (Nov. 22) 1952.

The Seal of Acceptance denotes that the nutritional statements regarding meat made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

American Meat Institute
Main Office, Chicago... Members Throughout the United States

Washington in August. This committee was formed to study and recommend to the Secretaries of the two Departments a program to improve wheat cleanliness and reduce wheat losses through rodent, bird, and insect depredation.

Dr. Charles Glen King, Scientific Director, The Nutrition Foundation, Inc., is chairman of the committee. Among other members are: Dr. Hazel K. Stiebeling, Chief, Bureau of Human Nutrition and Home Economics, U.S.D.A.; C. W. Crawford, Commissioner, Food and Drug Administration; and Dr. Glenn G. Slocum, Chief, Division of Microbiology, Food and Drug Administration.

Week Honoring Handicapped. October 4 through 10 will mark the ninth annual observance of "National Employ the Physically Handicapped Week," instituted by the American Federation of the Physically Handicapped. Contributions may be sent to: American Federation of the Physically Handicapped, Inc., 1370 National Press Building, Washington 4, D. C.

Elizabeth H. Pumplin. Word has been received of the death of Elizabeth Hepburn Pumplin of Chicago. Mrs. Pumplin had been a member of the Association for almost seventeen years. She was formerly on the dietary staff of New Haven Hospital, New Haven, Connecticut.

Sister Anna Margaret Musgrove. The administrator of St. Mary's Hospital, Winfield, Kansas, has notified the A.D.A. office of the recent death of Sister Anna Margaret Musgrove, who had been a member of the Association since 1945. She had also served on the staff of St. Anthony's Hospital, Dodge City, Kansas.

Dr. Loraine Myers. The A.D.A. office has been notified of the sudden death on July 27 of Dr. Loraine Myers. Dr. Myers, who became an A.D.A. member in June, was Professor of Nutrition at the University of Mississippi. She had been engaged in research this summer at the State University of Iowa.

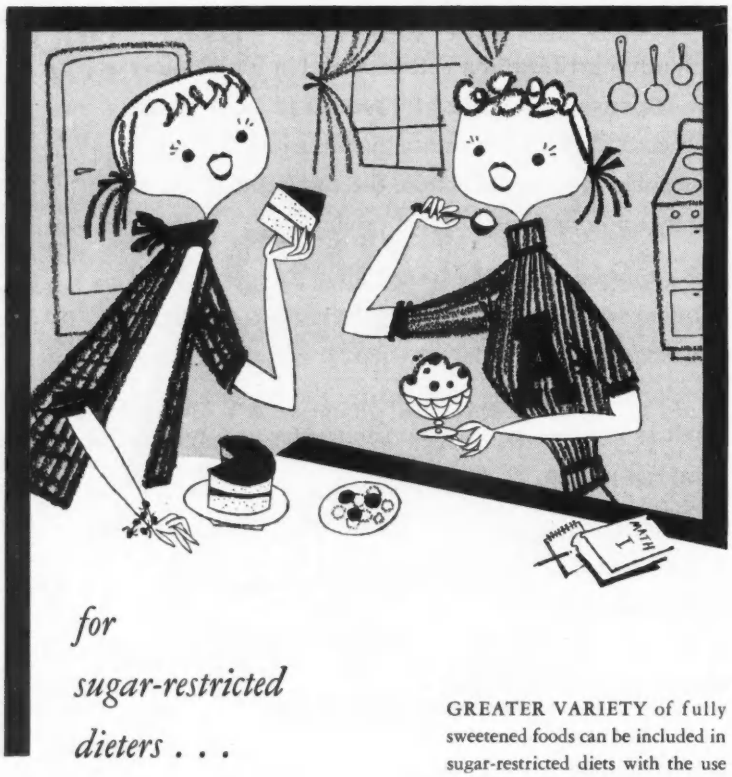
Freezing Milk. Dairy specialists of the U.S.D.A. say that fluid homogenized milk may be frozen conveniently in the paraffined containers in which it is sold. In freezing, the milk may bulge the sides of the containers slightly but there is enough headspace so that the seal will not be broken. In a good freezer, the milk should freeze solid within a few hours and, if held at 0°F., should keep its good flavor for about a month. Freezing milk in bottles is impractical because expansion during freezing will push up the cap, and in addition there is danger of breakage.

Freezing milk that has not been homogenized breaks down its natural emulsion so that, when thawed, it will not have the same consistency—it will separate into flaky particles and fat globules.

Unsweetened Frozen Fruits. Some fruits can be frozen as well without as with sweetening, according to the U.S.D.A. Among these are gooseberries, currants, raspberries, cranberries, blueberries, pineapple, and figs. Such fruits frozen without sweetening are in demand for low-calorie and low-carbohydrate diets.

Frozen dry-packed fruits lend themselves well to jelly-making, reports Dr. Faith Fenton of the New York (Cornell) Agricultural Experiment Station. The freezing and thawing cause the fruit colors to dissolve in the juice and the cells of the fruits to break, thus releasing the juices. No heating of frozen berries is necessary for the extraction of juice; therefore, any chance of overcooking and extraction of bitter tannins is prevented. Strawberry and raspberry jams and preserves made from frozen berries stored several months, Dr. Fenton says, are as good as those made from fresh fruit during the berry season, and superior to those made during the season and stored for several months.

To make jams and preserves from frozen fruit, place the dry-packed fruit, while still hard-frozen, in the cooking utensils or in hot sugar sirup. Proceed as you would in making jam or preserves from the corresponding fresh fruit. Commercial pectin is usually needed, because most people freeze fruit at the fully ripe stage to get its full flavor and natural sweetness. At this stage the fruit has less "jellying" power than when it is less ripe.



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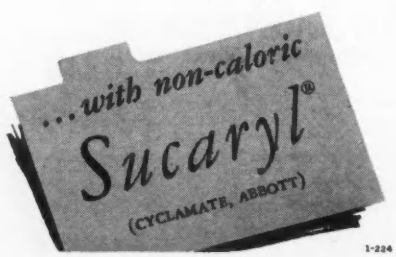
all the sweetness they want

GREATER VARIETY of fully sweetened foods can be included in sugar-restricted diets with the use of SUCARYL, because this new non-caloric sweetener can be used in all cooking, baking, canning and freezing processes without losing sugar-like sweetness. Dieters appreciate it, too, because there is no bitter or metallic aftertaste in ordinary use. SUCARYL is available at all pharmacies in both tablet and solution forms, including a calcium solution for use in low-salt diets. A supply of calorie-saving recipe booklets may be obtained by writing Abbott Laboratories, North Chicago, Ill.



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ideas

from Blickman-Built award-winning food service installations

"planned work flow" promotes kitchen staff productivity

AT BETH-EL HOSPITAL, BROOKLYN, N. Y.

COOKING SECTION, MAIN KITCHEN: Food conveyor traffic flows rapidly around this section in a counter-clockwise direction. Ample work surfaces are provided by the generously-proportioned cooks' tables. Note seamless work tops, rounded corners, welded tubular undershelves.

• Careful planning, based on work flow studies, is the key factor in the successful operation of Beth-El Hospital's food service installation. Both layout and equipment have been designed to function like a factory production line in serving approximately 50,000 meals per month. Large work areas with wide traffic aisles ensure rapid work flow and increase the productivity of kitchen labor. The modern stainless steel equipment embodies important features of utility and sanitation. These not only facilitate the overall operation, but reduce cleaning and maintenance costs as well.

Service to patients is provided through a decentralized system. Electrically-heated food conveyors are wheeled around the island cooking section in a counter-clockwise direction. They are loaded with foods at the cooking center, bakery and finally the daily stores section. Then, they are taken to individual floor pantries where set-up trays are loaded and placed in tray carts for distribution to patients. Each floor pantry is completely equipped with short order units, refrigerators, dish storage and washing facilities.

This installation, winner of a Merit Award in the 1952 Institutions Food Service Contest, was designed and equipped by S. Blickman, Inc. You, too, can attain top efficiency and economy in your dietary department by installing "Blickman-Built" equipment.

***Send for illustrated folder** describing Blickman-Built Food Service Equipment — available in single units or complete installations.*

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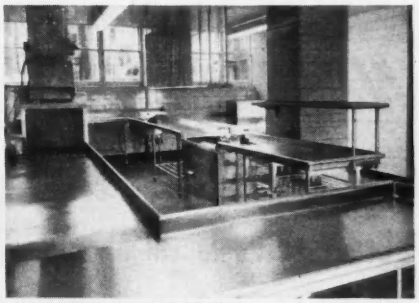
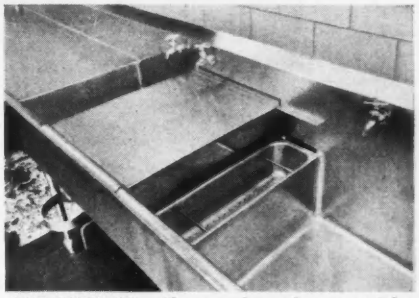


STAINLESS STEEL DISH TABLES in dish pantry. Work top and raised rolled edges form a continuous, crevice-free surface to assure maximum cleanliness.



POT SCULLERY — Close-up of round-corner stainless steel pot and pan sink. Compartments, drainboard and back splash form one continuous crevice-free surface, simplifying cleaning. The sliding tray permits placing of pots at convenient work height.

STAFF CAFETERIA accommodates visitors as well as hospital employees. Pass-through refrigerator at rear provides access to kitchen, eliminating waste motion and cross-traffic. Counter top is of stainless steel.

Blickman-Built
FOOD SERVICE EQUIPMENT

Vegetable Juice Concentrates. Better soups and stews may be in the Army's future if concentrated vegetable juices hold up under field conditions. Tests of the concentrates have been made at the New York (Cornell) Agricultural Experiment Station in combination with dehydrated meats and vegetables. Frozen concentrates of celery, onion, and white turnip juices held flavor and quality for as long as ten months when stored at room temperature in glass bottles, and improved the flavor of soups and stews to which they were added. Carrot, rutabaga, kale, and cabbage juice concentrates held their flavor well under frozen storage, but not at room temperature long enough to be of value under Army field conditions. However, civilians who can keep these products frozen may benefit if they come on the market.

Grape Juice Powder. A new method of preparing powdered grape juice has been developed at the Eastern Regional Research Laboratory of the U.S.D.A. but is not yet in commercial production. The powder dissolves rapidly and easily in water to become a juice with the full fine flavor and aroma of the grape.

Using Concord grape juice, the chemists first removed and saved the volatile flavor or "essence." Then they removed the pectin to prevent the juice from forming jelly, when concentrated. After the juice was concentrated by vacuum evaporation, the "essence" was added along with sugar. The mixture then was carefully dried, cooled, ground, and packaged. Tests of storage quality of the powder are now being made.

Keeping Mushrooms Fresh. Mushrooms—whether in shipment, storage, or retail display—need refrigeration. Tests at the Beltsville, Maryland, Agricultural Research Center reveal that freshly-picked mushrooms stay in perfect condition for only one day or less at 60° to 70°F., but will keep for one to two days at 40°F., or for as long as four to five days at 32°F.

Antioxidants for Candy. Yeast or oat flour triples the shelf-life of candies containing butter. Tests by the Bureau of Agricultural and Industrial Chemistry at the U.S.D.A.'s Southern Regional Research Laboratory in New Orleans, in cooperation with the National Confectioners' Association, have shown that rancidity can be greatly retarded by adding about 3 per cent brewers' yeast or special oat flour near the end of preparation of butter-containing candies. Dr. L. F. Martin and co-workers at the Laboratory found that fudge and butter creams can be protected by yeast for sixteen to nineteen weeks at 86°F., whereas unprotected creams became rancid in two to three weeks. Standard butter mints "kept" for only eight to nine weeks, but with yeast or oat flour added, they remained free from oxidative off-flavor for sixteen to nineteen weeks. Yeast and oat flour, both of which contain antioxidants, do not usually affect candy flavor.

Cultivated Poke. Pokeweed may become a cultivated crop as a result of research at the Arkansas Agricultural Experiment Station, which reports that poke greens can be adapted to mechanized field culture as a commercial canning crop or to garden culture for home use. The Arkansas studies on spring and fall plantings indicate that poke can be established as a perennial crop by seeding it in either season. The studies also showed that it can be harvested by machines used for other greens crops, and that once the plant is established several cuttings of shoots might be made during the growing season.

The young asparagus-like shoots of pokeweed have for generations been among the favorite wild spring greens or "cooking herbs," as old-time housewives called them. Farm families especially have gathered these tender shoots as a treat for springtime meals. The plant grows wild from Maine to Minnesota and south from Florida to Texas.

News of State Associations

California Dietetic Association. Officers for 1953–54 of the California Dietetic Association will be: President, Virginia F. Stokdyk, University of California Hospital, San Francisco; President-Elect, Marjorie Northrop Peterson, VA Hospital, Los Angeles; Treasurer,

NARY A CHIP...to mar it's beauty!

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Nancy Hooper, Stanford University Hospital, San Francisco; and Secretary, Maxine Merrick, VA Hospital, Fresno.

Mississippi Dietetic Association. Members of the Mississippi Dietetic Association recently cooperated with the Mississippi Home Economics Association in a campaign to promote milk-drinking in Mississippi institutions. Letters were written to orphanages and other child-care institutions, religious institutions, and junior and senior colleges. In response to sixty-three requests for additional service, demonstrations in the institutions' kitchens were held, to show how more milk could be included in the diet through cooking. A committee member also visited personally each institution where the demonstration was held. Also included in the educational program were: milk-drinking parties with the children in the institutions; educational meetings for adults on milk consumption; and mass distribution of posters and pamphlets on children's milk needs. Packets of quantity recipes using milk were distributed to one hundred institutions.

The newly published *Mississippi Diet Manual*, compiled by Margaret Webb and Sister Mary Jude, is not only for use of dietitians and medical and nursing personnel, but also those without professional training who may work in small institutions. Diets have been planned to be practical and as simply prepared as possible, and all are modifications of the normal diet. A sample menu for one day accompanies each diet. The manual is being sold for $2 a copy.

New Jersey Dietetic Association. New officers for 1953–54 are: President, Mary M. Griffin, Board of Education, Newark; President-Elect, Elaine Loseke, Paterson General Hospital, Paterson; and Treasurer, Jean Heller, VA Hospital, Lyons.

The annual fall meeting of the New Jersey Association will be held October 1 in Newark.

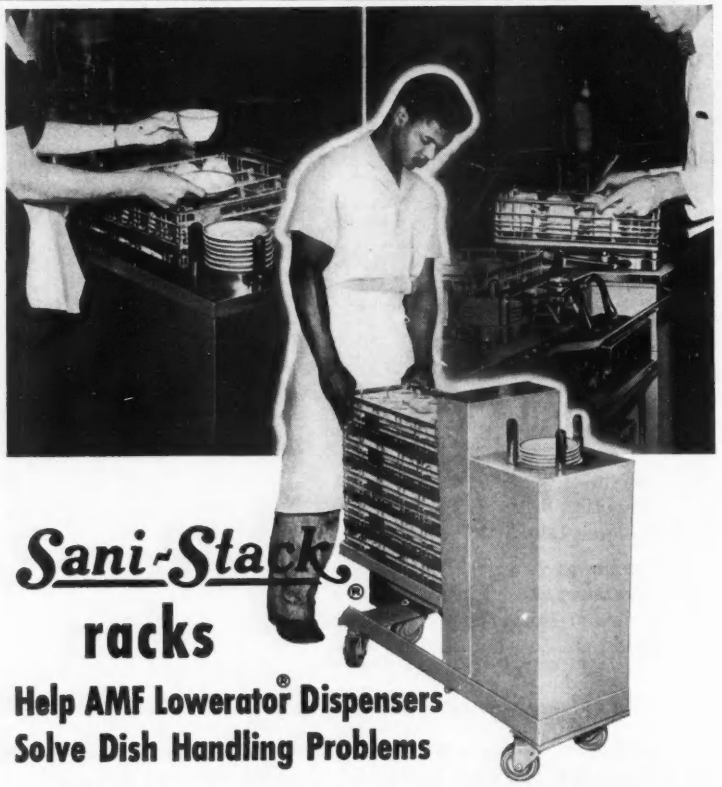
Ohio Dietetic Association. Ohio dietitians learned at their April convention that the T. V. DuBois Foundation has established a $200 scholarship fund for a dietetic intern. The company specified that the scholarship be granted for 1953–54, and that the applicant enter one of the three approved internships in Cincinnati. Eleanor Maclay of the University of Cincinnati has been appointed chairman of the DuBois Scholarship Committee.

Officers of the Ohio Dietetic Association for the coming year will be: President, Inistore Simms, Youngstown Hospital, Youngstown; President-Elect, Vivian Lippert Laird, Miami Valley Hospital, Dayton; Treasurer, Dorotha Symons, Christ Hospital, Cincinnati; and Secretary, Barbara Lorenz, Miami Valley Hospital, Dayton.

The mimeographed booklet, "Cooking without Salt for the Low Sodium Diet," prepared by the Diet Therapy Committee of the *Cincinnati Dietetic Association*, has again been revised. The booklet contains recipes for: fruits; vegetables; soups; salads and salad dressings; meat, fish, poultry, and eggs; breads and cereals; desserts; and beverages. Also included are general instructions and suggestions, notes on an adequate diet with a menu pattern, names of acceptable commercial low-sodium products, suggestions for eating out, and a list of lay books on the subject. The booklet is available for 20 cents a copy from: Eva N. Ylvisaker, The Children's Hospital, Cincinnati 29.

Ruth Laidig, University Hospital, has been elected President-Elect of the *Cleveland Dietetic Association* for 1953–54.

Professional Education Section members of the *Dayton Dietetic Association* recently sponsored a career project in which dietitians visited nine high schools. A dietitian spent an entire day in each school, talking to home economics classes, showing the A.D.A. Kodachrome slides, and distributing literature.



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News of Advertisers and Exhibitors

National Dairy Council has released a folder titled "Program Builders," which lists its educational films and film strips. The content of each visual aid is described, as well as technical data on running time, size, price, and so on.

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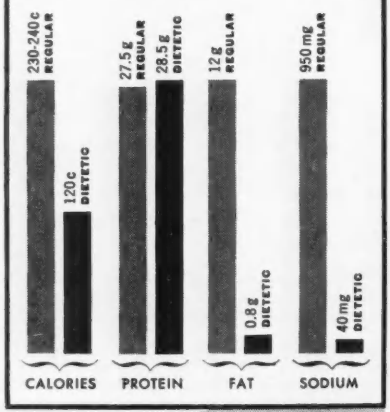

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This is a project of the Diet Therapy Section of The American Dietetic Association.

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Lily-Tulip Cup Corporation has recently made arrangements to market an assortment of heavy-duty plain and plastic-coated paper plates, to be manufactured by Fonda Container Company, Inc., St. Albans, Vermont. Harmonizing with other Lily items, the plates are available in three designs: the traditional leaf pattern in a choice of four colors, in solid pastel shades, or in the standard white. There will be a choice of plain finish or "Hi-Glaze" plastic surfacing which is reported to be impervious to heat and cold, liquids, and even knife scratches. All three styles will be furnished in bulk pack for commercial users and in home resale units.

Wyandotte Chemicals Corporation states that after experimentation with Antibac, its new, mildly acidic germicide, no corrosive action on aluminum has been found after overnight immersion in a 100-p.p.m. solution. Similar tests conducted with stainless steel showed no significant visual changes after 168-hr. immersion.

The *Market Forge Company* has introduced Steam-It, a new, electric, fully automatic, insulated counter model pressure cooker for small-scale food operators. The Steam-It operates under pressure of from 5 to 15 lb. Cooking is done in standard cafeteria pans, 12 x 20 x 2¼ in. deep, perforated or solid. Because Steam-It generates its own steam by the use of electricity, no water or drain line or steam connection is required—only a power connection. A clock makes cooking time completely automatic. The Steam-It, which weighs 175 lb. crated for shipment, is 18½ in. wide, 25 in. high, and 30 in. deep overall, and will fit on a counter 24 in. wide. If counter space is not available, a stainless steel stand is available.

Metropolitan Wire Goods Corporation announces the development of a glass creamer rack which eliminates hand washing of glass creamers. This rack is designed to hold 2 doz. soiled creamers in individual compartments with a cover which is slipped on after the creamers have been inserted. The rack is then inverted and placed in a standard dishwashing machine rack. Three creamer racks will fit into a single standard rack. After the creamers have been passed through the dishwashing machine, they are air-dried, the rack is flipped over, and the cover is removed. The rack, which occupies a space of 6 x 10 x 2½ in., is provided with stacking lugs, which enable the user to fill creamers in the rack and stack a number of racks in the refrigerator. The rack may be carried to the point of use, with creamers being withdrawn as needed and replaced by soiled ones.

Pineapple Growers Association has prepared a sixty-four page formula book for bakers. Included are more than forty formulas for pineapple pies, cakes, frostings, rolls, coffee cakes, and other desserts featuring this popular fruit. Each formula has been carefully tested by the American Institute of Baking and features ease and economy of preparation as well as taste and visual attraction. The book is attractively illustrated in color. It is available on request.